DOCUMENT RESUME

ED 118 944 CE 006 513

TITLE A Comparative Study of the Occupational Achievement of Vocational and Non-Vocational High School Graduates in Texas: Final Report.

INSTITUTION Texas Univ., Austin. Center for International Education.

SPONS AGENCY Texas Education Agency, Austin. Dept. of Occupational Education and Technology.

PUB DATE 30 Jun 73

NOTE 183p.

EDRS PRICE MF-$0.83 HC-$10.03 Plus Postage

DESCRIPTORS *Achievement; Comparative Analysis; Employment Level; Employment Opportunities; Followup Studies; Graduate Surveys; *High School Graduates; Income; Job Tenure; Occupational Surveys; Participant Characteristics; Questionnaires; *Relevance (Education); Research Methodology; Socioeconomic Background; Tables (Data); *Vocational Education; *Vocational Followup

IDENTIFIERS Texas

ABSTRACT

The final report describes a Texas study to determine if differences in occupational achievement existed between those high school graduates who had been enrolled in vocational education programs and those who had not. A questionnaire was sent to 3,045 individuals who graduated from high school in 1970 in Austin, San Antonio, and Houston, to determine their occupational achievement. Statistics were based upon the 894 questionnaires returned, with six variables of income and length of employment used: accumulated income, monthly earnings, hourly rate, weekly working hours, employed months, and actual job length. Analysis of variance and multiple regression analysis were the statistical techniques used. A summary is provided and chapters include: (1) study background information; (2) descriptions of research methods and techniques; (3) discussion of test factor associations; (4) presentation of preliminary analysis findings; (5) presentation of further testing; (6) discussion of conclusions and policy implications. Thirty-one tables supplement the text. Appended material includes additional tables, the questionnaire and accompanying letters, and extensive coded raw data on the 894 participants. It is stated that vocational education has proved effective as pre-employment training for those graduates who made a direct transition from school to work. (LE)

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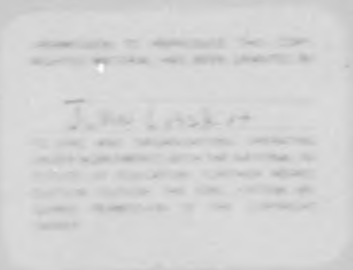

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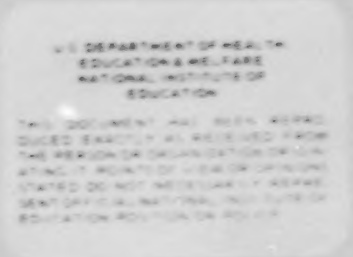

# A COMPARATIVE STUDY OF THE OCCUPATIONAL ACHIEVEMENT OF VOCATIONAL AND NON-VOCATIONAL HIGH SCHOOL GRADUATES IN TEXAS

Final Report

June 30, 1973

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## Summary


A COMPARATIVE STUDY OF THE OCCUPATIONAL ACHIEVEMENT OF VOCATIONAL AND NON-VOCATIONAL HIGH SCHOOL GRADUATES IN TEXAS

The main problem that this study attempted to investigate was to determine whether there were real differences in occupational achievement between the high school graduates who had been enrolled in vocational education programs and the graduates who had not been enrolled in these programs.

A questionnaire was developed for a survey of occupational achievement of the young workers who graduated from high school in May, 1970, in the three Texas cities of Austin, San Antonio, and Houston. A total of 3,045 graduates were selected from 17 high schools in the three cities cited for the mailing of questionnaires. The results of this study were based on 894 completed questionnaires (a 29 percent response rate).

Six variables of income and length of employment were used as the indicators of the occupational achievement of high school graduates: accumulated income, monthly earning, hourly rate, weekly working hours, employed months, and actual job length.

The statistical techniques of analysis of variance and multiple regression analysis were used to analyze the

data secured from the completed questionnaires. Analysis of variance was utilized to test the significance of the differences in occupational achievement between vocational and non-vocational graduates when some school-related and non-school-related variables are taken into account. For a complementary role, multiple regression analysis provided relevant information for the proper procedures of controlling school-related and non-school-related variables.

The two major findings of this study may be stated as follows:

1. Of the 894 respondents included in the analysis, 244 completed two years or more of college during a 27-month period after graduation from high school, while 157 attended college for some time ranging from 4 to 18 months during the same period of time. For these 401 working college students, with one exception secondary vocational education was not an important variable in accounting for their occupational achievement after high school when community, sex, and college attendance were controlled. This also was true for female non-college graduates in the Houston area.

2. There were, however, significant differences in accumulated income and actual job length between non-college vocational and non-vocational graduates of both sexes in the Austin-San Antonio area. Also, there were

significant differences in accumulated income, monthly earning, and hourly rate between male non-college vocational and non-vocational graduates in the Houston area. When the marital status, ethnicity, social origin and academic achievement of these students were controlled, the significant differences in occupational achievement were basically unchanged.

In answering the attacks directed against secondary vocational education, this study provides positive evidence for the effectiveness of vocational education as preemployment training for those vocational graduates who made the transition from school to work without attending college. The allegations which dismiss secondary vocational education as having no significance for employment or as being a waste of public resources must supply more conclusive evidence for their assertions. Based on the findings of this study, the continuing support of secondary vocational education can be justified for those who wish to enter the world of work rather than attend college after graduation from high school.

ACKNOWLEDGMENTS

This study was accomplished under a contract with the Department of Occupational Education and Technology of the Texas Education Agency. It involved the collection of data from 17 high schools in 5 Texas independent school districts--Austin I.S.D., North East I.S.D., San Antonio I.S.D., Aldine I.S.D., and Houston I.S.D. The information for this study was obtained from the high school graduates who had completed high school in these school districts in May, 1970. Deep appreciation must be expressed to the many persons in the Texas Education Agency, the school districts cited, and the project schools whose generous assistance made this study possible. A debt of graditude is also owed to the high school graduates who participated in the questionnaire survey which provided the essential information for this study.

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# CHAPTER I

## PROBLEM, PURPOSE, AND ORGANIZATION OF THE STUDY

### Issue of Accountability of Vocational Education

Vocational education has been promoted in American colleges and schools for a long period of time. Since the passing of the Morrill Act of 1862, vocational education at the college level has received federal encouragement and appropriations.[1] Before the turn of this century, vocational education had been introduced into American high schools. However, the Smith-Hughes Act of 1917 was the first legislation which provided federal aid to vocational education in high schools.[2] In the past decade, federal appropriations for vocational and technical education have experienced unprecedented growth. The Vocational Education Act of 1963 authorized appropriations of $60 million for the 1964 fiscal year, $118.5 million for the 1965 fiscal year, and $225 million for each subsequent fiscal year.[3] The Vocational Education Amendments of 1968 authorized appropriations of $335 million for the 1969 fiscal year, $565 million for the 1970 fiscal year, $675 million for the 1971 and 1972 fiscal years, respectively, and $565 million for the 1973 fiscal year.[4] Under the Acts of

1963 and 1968, federal expenditures for vocational-technical education were $225.9 million, $230.4 million, and $227.5 million in the respective fiscal years of 1967, 1968, and 1969. It is apparent that the actual expenditures somewhat exceeded the authorized appropriation of $225 million in each of 1967 and 1968 fiscal years while the 1969 expenditures were far short of reaching the maximal authorized appropriation of $335 million. In addition to the appropriations provided by the Vocational Education Act of 1963 and its Amendments of 1968, some federal funds were also available to contribute to recent federal support of vocational education under the Smith-Hughes Act and the George-Barden Act. Therefore, federal annual expenditures for vocational-technical education were slightly higher than those provided under the Acts of 1963 and 1968. In terms of actual figures, the grand totals of federal expenditures for vocational-technical education were $260.3 million, $262.4 million, and $254.7 million for the respective fiscal years of 1967, 1968, and 1969 (see Appendix A.1).

However, the state and local funds which matched federal appropriations for vocational-technical education were far greater than the federal expenditures cited. State and local matching funds for vocational-technical education were $743.8 million, $930.5 million, and $1,114.1 million for the respective fiscal years of 1967, 1968, and 1969.

In the State of Texas, a total of federal funds of $46.9 million was spent for vocational-technical education for the three fiscal years of 1967, 1968, and 1969 combined. The matching funds from state and local sources amounted to a total of $131.0 million for the same three years (also see Appendix A.1). For the three subsequent fiscal years of 1970, 1971, and 1972 combined, the public expenditures for vocational-technical education consisted of a total of $66.6 million from federal sources and a total of $251.0 million from state and local sources.[5]

Since huge portions of educational funds have been and will continue to be invested in vocational education, concerned and interested taxpayers, legislators, and political leaders have a legitimate right to inquire about the efficacy of those large expenditures in preparing students for gainful employment in the labor market.

Industry and business have been widely noted for their emphasis on accountability. Even in many areas of public service, this very concept of being accountable is pursued. However, education is traditionally blamed for its lack of accountability. During recent years, public education has received increasingly strong pressures for accountability from legislators, political leaders, as well as the general public. Vocational education is a logical target. Establishing new programs, upgrading existing programs, and improving teacher training in vocational education are con-

sidered as resource input. Unless the output of vocational education is evaluated, there is no answer to the public demand for accountability in preparing youth for actual employment.

One of the best ways for evaluating the output of vocational education is to conduct follow-up studies of the students who have graduates from various programs of vocational training. Empirical research findings from these studies could produce feedback for vocational education programs in their continuing process of improvement and re-direction.

Review of the Related Literature

There have been numerous follow-up studies of post-graduate employment and related experience of high school graduates. Many of these studies compare vocational education graduates with non-vocational graduates in various dimensions of occupational achievement and employment experiences.

Dealing with the income of high school graduates, several studies consistently reveal that starting pay received by vocational education graduates was not significantly different from that received by non-vocational graduates. On the other hand, the failure to earn higher pay was compensated for by the fact that vocational education graduates had a longer time of employment and a higher degree of

job satisfaction than did the graduates who had not been enrolled in vocational education.[6]

For a more complete understanding of the relationships of education to the income of working youth, other relevant variables must be considered. Little reports that a study conducted by Olien and Donahue indicates that girls from the city attained professional goals proportionately more often than girls from rural areas.[7] Lane's study of six metropolitan centers points out a significant city effect on the relationship of education and social origin to occupational prestige.[8] These studies suggest that community differences must be a relevant variable in a follow-up study of occupational achievement of high school graduates.

On the basis of a state-wide follow-up study in Wisconsin, Little reports that the prestige level of occupations attained have little correlation with the level of scholastic achievement in high school. College education improves the chances of increasing the level of occupation attained.[9] Perrucci and Perrucci also report that college grades are directly related to career mobility. These findings seem to lead to the theory that high school academic records are not related to occupational mobility as college grades are.[10] Nevertheless, Little reports that the San Mateo, California follow-up study points out the fact that 50 percent of high school graduates were asked by employers about academic grades.[11] Therefore, whether high school

grades are a significant factor in occupational achievement should be a relevant question in a study of initial employment of high school graduates.

The studies of Kaufman and Lewis, and Kaufman et al. show that variations in social origin are found between vocational education students and their non-vocational counterparts. In comparison with non-vocational students, those enrolled in a vocational curriculum were less represented by families with fathers in white-collar occupations and by families with fathers finishing high school and having a college education.[12] However, the cited studies do not conceptualize social origin as a variable which is directly related to the occupational achievement of high school graduates. On the other hand, Ecklan's study of occupational mobility indicates that without a college degree, occupational achievement was significantly affected by social origin.[13] Straus and Homberg report that among high school juniors and seniors in part-time employment, middle class boys were more likely to be employed for longer hours and to earn more.[14] It is another relevant question to inquire whether social origin influences initial employment of high school graduates.

Lieberson and Fuguitt report that the absence of racial discrimination in the job market would not eliminate racial differences immediately. They predict that several generations would be necessary before the disadvantages of Negroes in occupations were eliminated.[15] In his study of

the relationship between school integration and occupational achievement of Negroes, Crain points out effects of racial composition of school on occupational success of Negro graduates.[16] Kaufman et al. indicate that despite variations among vocational programs, Negro graduates both started at lower average wages and received smaller increments than did white graduates.[17] According to these findings, ethnicity should be a relevant variable in a follow-up study of vocational education graduates.

In summary, a review of existing research indicates that earnings, length of employment, job satisfaction, occupational status, and occupational mobility were commonly used as the indices of occupational achievement. Some other variables were found relevant in accounting for these indices of occupational achievement. They were sex, ethnicity, academic achievement, social origin, college attendance, community differences, and vocational education. The findings obtained from existing research were extremely useful in developing the conceptions and deciding the scope of this study.

## Six Indices of Occupational Achievement

Occupational achievement is a term which has been used loosely without being precisely defined. Anything which is used as a relevant criterion for evaluating the job-related attainment and satisfaction can be considered as an index of occupational achievement. In this study, income

and length of employment are used as the criteria for the occupational achievement of high school graduates. However, by no means are they considered to be the only relevant criteria of occupational achievement.

More explicitly, the measures of occupational achievement used in this study include certain aspects of income and length of employment of high school graduates of the 1970 class in Texas cities during the period of 27 months after graduation, dating from June 1, 1970 until August 31, 1972. The information on occupational achievement was obtained from Item 11 in 894 completed questionnaires. From this information, six kinds of data were derived as the indices of occupational achievement of high school graduates in this study. Accumulated income, monthly earning and hourly rate were derived to measure the income aspects of occupational achievement, whereas weekly working hours, employed months and actual job length were derived to deal with the length of employment. These six indices were computed for each of 894 respondents. Since previous research included only some of the six indices cited in a single study, the inclusion of all six indices makes the findings of this study more comparable with the findings of other studies.

The accumulated income is defined as the total income earned by a high school graduate for all of the jobs he or she obtained during a period of 27 months after gradu-

ation (the end of May, 1970), as computed by Formula 1.1 below. Monthly earning is the average pay per month earned by a graduate during the time when he or she was employed, as computed by Formula 1.2. Finally, the hourly rate is the average pay per hour earned by a graduate during the time he or she was employed, as computed by Formula 1.3. Since the number of working hours per week is not necessarily uniform during different periods of employment for an individual graduate, there is a distinction between the monthly earning and the hourly rate. The formulas for the income-related variables are

Accumulated income =

$$\Sigma X_i M_i \text{ or } \Sigma 4.2857\ Y_i M_i \qquad (1.1)$$

Monthly earning =

$$\Sigma X_i M_i / M_i \text{ or } \Sigma 4.2857\ Y_i M_i / M_i \qquad (1.2)$$

Hourly rate =

$$\Sigma X_i M_i / 4.2857\ H_i M_i \text{ or } \Sigma Y_i M_i / H_i M_i \qquad (1.3)$$

with $X_i$ = monthly pay rate for any one of the jobs taken, $Y_i$ = weekly rate for one of the jobs, $M_i$ = months staying in any one of the jobs, $H_i$ = the working hours per week for any one of the jobs. The number 4.2857 stands for the number of weeks for each month; this number was obtained by dividing 30 days by 7 days.

Weekly working hours is defined as the average of different working hours per week in the jobs taken by a

graduate during a post-high school period of 27 months, as computed by Formula 1.4 below. Employed months is the number of months in which a graduate was employed without taking into account the working hours per week, as computed by Formula 1.5. If one worked ten hours per week for a month, one's employed months is counted as a month just as in the case of one who worked forty or more hours per week for a month. There is no distinction to be made between the two cases. However, the actual job length (total man-months worked) was conceived to distinguish different amounts of work-loads in the same period of employed time. It is defined as the number of months to be counted on a basis of forty working hours per week, as computed by Formula 1.6. If one worked for twenty hours per week for a duration of two months, his actual job length is counted as one month instead of two months. The cited formulas are

Weekly working hours =

$$\Sigma 4.2857H_iM_i / 4.2857M_i = \Sigma H_iM_i/M_i \quad (1.4)$$

Employed months = $\Sigma M_i$ (1.5)

Actual job length =

$$\Sigma 4.2857H_iM_i/4.2857x40 = \Sigma H_iM_i/40 \quad (1.6)$$

Of the six indices of occupational achievement of high school graduates used in this study, the accumulated income is a composite variable which is related to all five of the other indices. There are two reasons to support this

assertion. The first reason is that the correlations of accumulated income with the five other indices are all positive and higher than any other correlations of one index with the other indices. Although its correlation coefficient with weekly working hours is .28, the accumulated income has correlation coefficients ranging from .61 to .81 with four other indices (see Appendix A.2). The other reason is that accumulated income is associated by a correlation coefficient of .97 with the first principal component extracted from the intercorrelation matrix of six indices cited (see Appendix A.3). The first principal component "contributes a maximum to the total variance."[20] In accounting for six indices of the occupational achievement of high school graduates, the first principal component accounts for 55.33 percent of the total variance. Since the correlation coefficient is .97 between the accumulated income and the first principal component, the accumulated income is almost identical to the first principal component which represents the highest possible portion of information common to all six indices.

However, the principal component of accumulated income is not adequate enough in representing the occupational achievement of high school graduates as conceived in this study, because an exclusive use of accumulated income will leave unaccounted for almost half of the total variance of six indices of occupational achievement. An orthogonal

varimax rotation factor analysis produces three independent factors. They are labeled as the number of months of employment, the pay rate per hour, and the number of hours worked per week because the indices of employed months, hourly rate, and weekly working hours were nearly perfect measures of the three factors. Besides, the accumulated income is much related to both factors of "number of months of employment" and "pay rate per hour"; the monthly earning is much related to both factors of "pay rate per hour" and "number of hours worked per week"; and, the actual job length is extremely highly related to the factor of "number of months of employment" while it has a slight relationship with the factor of "number of hours worked per week" (see Appendix A.4).

Statement of the Problem

This study is designed as a follow-up survey of the occupational achievement of high school graduates during the period of transition from school to work. The main problem here is to find out whether there are real differences in occupational achievement between the high school graduates enrolled in vocational education programs and the graduates not enrolled in these programs. Vocational education programs cannot be effective enough unless the persons who received training from these programs have better showings in occupational achievement than the persons who did not have such training. The principal interest in this study is to

compare the occupational achievement of vocational and non-vocational high school graduates cited, and thus to inquire whether vocational education is a significant independent variable in accounting for the variations in occupational achievement of these graduates.

However, even if the differences in occupational achievement between vocational and non-vocational high school graduates are statistically significant, there are risks of getting a spurious relationship between vocational education and occupational achievement. Unless some relevant school-related and non-school-related variables are introduced as test factors in the analyses for this study, no confidence can be given to the differential occupational achievement, if any, for vocational and non-vocational high school graduates. More explicitly, the possibility is not ruled out that the links between vocational education and occupational achievement are not genuine relationships but that the links between them are caused by test factors which have associations to both vocational education and occupational achievement of high school graduates. If this is the case, the links between vocational education and occupational achievement will disappear when these test factors are controlled. The test factors that have common associations with two other variables and also establish a spurious relationship between these two variables are termed extraneous variables.[18]

Therefore, some relevant school related and non-school-related variables, which are identified by existing research and the preliminary questionnaire survey, should be included as test factors in analyses so that the possible differences in occupational achievement between vocational and non-vocational high school graduates can be judged as either genuine or spurious in this study. In order to represent clearly and explicitly the problem involved, an hypothesis will be helpful to develop the necessary conceptions for this study. The hypothesis is formulated as follows:

> High school graduates who enrolled in secondary vocational education programs have, on the average, higher accumulated income, higher monthly earning, higher hourly rate, more working hours per week, more employed months, and longer actual job length than do the graduates who never took secondary vocational training, if differences due to some non-school-related and school-related variables (such as sex, community, ethnicity, social origin, marital status, college attendance, and academic achievement) are controlled.

Scope of the Study

Although existing research provides some school-related and non-school-related variables which may be relevant in accounting for the occupational achievement of high school

graduates, no comprehensive investigation was conducted by taking all of these relevant variables into account. This study is an attempt to establish the relationships between secondary vocational education and the occupational achievement of high school graduates by considering other relevant variables as test factors to be controlled. The methodology used in this study is more sophisticated than that used in most of the previous studies.

However, the test factors taken into account in this study were not all-inclusive. Many school-related and non-school-related variables which also may be relevant to an investigation of the occupational achievement of high school graduates, are beyond the scope of this study. For example, quality of teaching personnel, teaching facilities for vocational programs, work motivation and other personality traits of students, and labor market situations are not taken into account in this study. Therefore, the scope of this study is quite limited by excluding many possibly relevant variables from the investigation.

Purpose of the Study

This study is an attempt to provide information that can be used to evaluate the relationship between high school vocational education and the occupational achievement attained by its graduates during the transition from school to work. It is expected to produce evidence which shows whether vocational education is effective and productive in

preparing young people for employment after graduation. More specifically, this study aims at obtaining findings which may be utilized to contribute to education and employment in three different ways, as follows:

In the first place, evaluation of vocational education, judged in terms of the graduates' occupational achievements, will produce relevant feedback for educational planners, vocational teachers, and interested educators. This feedback will indicate both the strengths and weaknesses will serve as a reliable basis for constructive criticism and improvement.

Secondly, with more knowledge of both the merits and defects of past performance in vocational education programs, educational planners and vocational educators can more accurately inform the federal government, the state legislature and the general public so that both understanding and cooperation can be sought in handling problems of vocational education more realistically and more effectively.

Finally, since this study specifically deals with occupational achievement and employment experiences of high school graduates in their first two years after graduation, relevant information about these adolescent workers will be useful for educational institutions, public and private employment agencies, interested employers, and other enthusiastic individuals and organizations who are willing to help these youngsters smoothly transfer from school to work.

Since adolescent workers are not mature, intellectually and emotionally, it is a moral obligation for the society as a whole to give all assistance available to these inexperienced new workers.

Organization of the Remaining Chapters

This study consists of three major steps in handling the problem of the relationship of secondary vocational education to occupational achievement of high school graduates in Texas cities. At the first step, sex, community, and college attendance are chosen as the first three test factors to be controlled, because of their significant associations with occupational achievement and for secondary vocational education of these high school graduates. Then, the preliminary analysis of the effects of secondary vocational education are made with the three test factors simultaneously controlled. At the final step, additional test factors such as marital status, ethnicity, father's occupation, father's education, and academic achievement are included as controlled variables in turn for further testing the effects of secondary vocational education.

Before the results from the above analyses are presented, the descriptions of research methods and techniques in this study will be presented in Chapter II. The associations of test factors to secondary vocational education and occupational achievement of high school graduates are reported in Chapter III. The findings from the preliminary

analysis of the effects of secondary vocational education are discussed in Chapter IV. Then, the results of further testing of these effects are included in Chapter V. Finally, the conclusions of this study and the policy implications deduced from them are elaborated on in Chapter VI.

## NOTES

[1]John F. Thompson, Foundations of Vocational Education (Englewood Cliffs, N.J.: Prentice-Hall, 1973), pp. 69-71.

[2]Ibid., p. 74.

[3]U.S. Congress, House, An Act to Strengthen and Improve the Quality of Vocational Education and to Expand the Vocational Education Opportunities in the Nation, to Extend for Three Years the National Defense Education Act of 1958 and Public Law 815 and 874, Eighty-first Congress (Federally Affected Areas), and for Other Purposes, Public Law 88-210, 88th Congress, Dec. 18, 1963, H.R. 4955, pp. 1-3.

[4]U.S. Congress, House, An Act to Amend the Vocational Education Act of 1963, and for Other Purposes, Public Law 90-576, 90th Congress, October 16, 1968, H.R. 18366, pp. 1-2, 9.

[5]The information was secured from the administrative office of the Department of Occupational Education and Technology, Texas Education Agency, and is based on the duplicate copies of OE Forms 3131 entitled Expenditures for Vocational Education by Source, Purpose and Level for the fiscal years of 1970, 1971, and 1972, which were submitted to the Office of Education, the U.S. Department of Health, Education and Welfare.

[6]J. Kenneth Little, Review and Synthesis of Research on the Placement and Follow-up of Vocational Education Students (Columbus, Ohio: Center for Vocational and Technical Education, 1970), pp. 23-6.

[7]Ibid., p. 6.

[8]Angela Lane, "Occupational Mobility in Six Cities," American Sociological Review 33 (October 1968): 740-47.

[9]Little, "The Occupations of Non-College Youth," American Educational Research Journal 4 (March 1967): 147-53.

[10]Carolyn Cummings Perrucci and Robert Perrucci, "Social Origins, Education Contexts, and Career Mobility," American Sociological Review 35 (June 1970): 451-62.

[11]Little, Placement and Follow-up, p. 11.

[12]Jacob J. Kaufman and Morgan V. Lewis, The Potential of Vocational Education (University Park, Penn.: Institute for Research on Human Resources, Penn. State Univ., 1968), Tables 25 and 26, pp. 56-57; Jacob J. Kaufman et al., The Role of Secondary Schools in the Preparation of Youth for Employment (University Park, Penn.: The Institute for Research on Human Resources, Penn. State Univ., 1967), Tables 6.3 and 6.4, Chapter 6, pp. 6-7.

[13]Bruce K. Ecklan, "Academic Ability, Higher Education and Occupational Mobility," American Sociological Review 30 (October 1965): 735-46.

[14]Murrary Straus and Katherine H. Homberg, "Part-time Employment, Social Class, and Achievement in High School," Sociology and Social Research 52 (April 1968): 224-30.

[15]Stanley Lieberson and Glenn V. Fuguitt, "Negro-White Occupational Differences in the Absence of Discrimination," American Journal of Sociology 73 (September 1967): 188-200.

[16]Robert L. Crain, "School Integration and Occupational Achievement of Negroes," American Journal of Sociology 75 (January 1970): 593-606.

[17]Kaufman et al., Preparation of Youth, Table 9.13, Chapter 9, p. 16.

[18]A detailed discussion of extraneous variables with examples in existing research is presented in The Logic of Survey Analysis by Morris Rosenberg (New York: Basic Books, 1968), pp. 27-40, 72-3.

[19]A brief summary of the characteristics of principal components is made in Modern Factor Analysis by Harry H. Harman (2nd ed.; Chicago: University of Chicago Press, 1967), pp. 136-37.

## CHAPTER II

## METHODOLOGY: PROCEDURES AND TECHNIQUES

Before proceeding with a discussion of the major findings, it is necessary to inform the reader of how the data were collected and analyzed in this study. In this chapter, four principal procedures for collecting the basic data of occupational achievement, and two major statistical techniques for handling data analysis will be reported. The procedures involved are: to develop the questionnaire for the problems of this study, to select the sample for the questionnaire survey, to solicit the responses from the sample selected, and to decide the period of time for investigation. The two statistical techniques on which this study depends most are analysis of variance and multiple regression analysis. Each of these procedures and techniques will be presented in order as follows.

### Construction of the Questionnaire

A preliminary questionnaire of occupational achievement for high school graduates was developed for the purpose of testing for verbal comprehension. Eleven high school graduates (three men and eight women) were invited to fill in the questionnaire and to participate in discussing

each of the questionnaire items. All of them graduated from the high schools in Austin, Texas, in May, 1970, and were working in Austin at that moment. Each of them had been contacted by both telephone and invitation letter, and had been promised an award of $7.50 for a two-hour period of participation. The purpose of offering this payment was to ensure their participation as scheduled and to encourage their enthusiastic cooperation.

In order to make close communication possible, three sessions were arranged for the trial testing of verbal comprehension. Each session was limited to three or four persons and lasted about two hours. The questionnaire was revised on the basis of the reactions elicited from the eleven participants, and it was served for the purpose of preliminary questionnaire survey.

The revised questionnaire was sent to each of four hundred high school graduates in Austin and Houston, Texas. These people also graduated in May, 1970, from high schools in the Austin Independent School District (I.S.D.), Aldine I.S.D. (in Houston) and Houston I.S.D. This procedure had a double purpose--to estimate a possible response rate for the questionnaire of six pages and to secure information for further improvement of the questionnaire.

In responding to the preliminary questionnaire survey, 108 graduates (27 percent) returned the completed questionnaires in pre-stamped, self-addressed envelopes,

over a period of forty-five days; forty-two questionnaires (11 percent) were returned by the post office because of no forwardable addresses. These results provided confidence for a relatively high return rate with a six-page questionnaire for high school graduates.

The data obtained from the returned questionnaires were analyzed to provide the basis for a final revision of the questionnaire. Both the format and the content of some questionnaire items was revised as a result of item analysis. Some items were judged as dispensable in this study because they provided the redundant information which could be obtained from other items. Redundant items included mother's education and occupation, the availability of a job, information about first job, attitudes towards family and friends, preferences toward jobs, and directly related items. Moreover, the trial procedure for item analysis produced some information which indicated unanticipated significance of several variables such as college attendance, marital status, business education, and industrial arts. These results led to the re-ordering of priorities in adding and dropping the items used in the final questionnaire.

## Selection of Sample

The basic principle in sample selection in this study was to obtain two comparable groups in each project school. One of the groups consisted of the graduates who

earned a minimum of two units of credit upon satisfactory completion of at least one year of a training program for gainful employment in vocational agricultural education, vocational distributive education, vocational industrial education, or vocational office education. The other group consisted of the graduates who did not enroll in any of the vocational programs in high school. The non-vocational group was selected to match the vocational group according to sex and accumulated scholastic ranking for all high school courses. Given the existing conditions of permanent records for students, this was the only realistic way to select comparable vocational and non-vocational groups.

For convenience in selecting vocational graduates, two units of credit in vocational programs were considered as the criterion in this study whenever the student records in project schools or the information on vocational graduates in project school districts were accessible to the investigator. This criterion was considered justifiable in view of the information in Standards for Public Schools Operating Programs of Occupational Education for In-Service Students, which was issued by the Texas Education Agency in March, 1971. As a general rule, the Standards for each vocational education program specified that "the student may earn two credits per year toward the basic 16 required" upon satisfactory completion of one of the approved programs in vocational education.

As far as secondary vocational education is concerned, there are seven broad areas of vocational education programs in Texas public high schools. Due to small enrollments in vocational health occupations education, vocational homemaking education (gainful), and coordinated vocational academic education, high school graduates who completed vocational education in these areas are excluded from this study. According to the state-wide statistics, there have been larger enrollments in the four other areas cited earlier, which thus provide a more adequate base for manipulations of data obtained from a questionnaire survey. The point is that prior considerations should be made in order to avoid wasting time and resources in collecting probably inconclusive information.

The lists of names of the 1970 graduates, along with the latest home addresses, and accumulated scholastic rankings for four years, were obtained from 17 public high schools in five independent school districts in the state of Texas. The investigator secured cooperation from the project schools in collecting the above information through an approved letter or personal arrangement from district directors of vocational education, from research and development, or from the principals of these schools. Some information on vocational graduates was sought from the district office when a project school was unable to produce it for the investigator.

Mailing of Questionnaire and Response Rates

A final version of the questionnaire (see Appendix B.1) and a letter requesting cooperation (see Appendix B.2) were mailed to each of 3,045 graduates selected in this study. The results of each of two mailings are presented in Table 2.1. The first mailing was made during the period from August 12 to August 14, 1972. Until September 4, 1972, a total of 567 graduates had completed the questionnaires and sent them back by first class self-addressed envelopes, while 424 could not be reached for various reasons, such as no forwardable addresses, being away from home, or reported as deceased by their families. Two graduates indicated their refusal to answer questions. Among the original sample of 3,045 graduates, there were 2,052 persons who did not respond to the request for cooperation by the time the second mailing of the questionnaires was made.

During the period from September 4 to September 6, 1972, each of 2,052 graduates who did not respond to the first request were sent a second copy of the questionnaire enclosed with another letter written differently from the first letter (see Appendix B.3). By the cut-off date of October 15, 1972, an additional 491 graduates had returned the questionnaires with their occupational information. Seventy-eight graduates could not be reached by mail. Six people stated that they had no intention of filling out the

TABLE 2.1

DISTRIBUTIONS OF RESPONSES OF 3045 HIGH SCHOOL GRADUATES IN TEXAS TO TWO MAILINGS OF QUESTIONNAIRES

| Responses or Non-responses | First Mailing by Sept. 4, 1972 | Second Mailing by Oct. 15, 1972 | Total in Two Mailings |
|---|---|---|---|
| Returned Questionnaires | 567 (19%) | 491 (24%) | 1058 (35%) |
| Non-contacts | 424 (14%) | 78 (4%) | 502 (16%) |
| Undelivered questionnaires (no forwardable addresses) | 413 (14%) | 61 (3%) | 474 (15%) |
| Addressees deceased | 10 ( - ) | -- | 10 ( - ) |
| Addressees away from home | 1 ( - ) | 17 (1%) | 18 (1%) |
| Non-responses | 2054 (67%) | 1483 (72%) | 1485 (49%) |
| Declined to respond to questionnaires | 2 ( - ) | 6 ( - ) | 8 ( - ) |
| No answer at all | 2052 (67%) | 1477 (72%) | 1477 (49%) |
| Total sample selected for mailing | 3045 (100%) | 2052 (100%) | 3045 (100%) |

questionnaires mailed to them. A total of 1,477 graduates failed to respond to either mailing.

In all, there were 1,058 (35 percent) out of 3,045 graduates who responded to this study; 502 (16 percent) of them were not contactable by questionnaire mailing, and 1,485 (49 percent) of them either notified us of their refusal to give cooperation or did not return the questionnaires by the deadline set in this study (see Table 1.2).

The response rates differ from school to school and vary from district to district. The response rates by school range from 49 percent (Travis High School, Austin I.S.D.) to 17 percent (Anderson High School, Austin I.S.D.) and the response rates by district spread from 42 percent (North East I.S.D.) to 31 percent (San Antonio I.S.D.). The response rates of high school graduates selected in this study were not necessarily related to ethnicity or accurate addresses (see Table 2.2).

Among the five high schools with response rates of 41 percent or higher, four of them were all white or predominantly white schools and the fifth one predominantly Mexican-American (Johnston High School, Austin I.S.D.). Out of the four high schools with the response rates of 29 percent or lower, one was an all black school; another, an all Mexican-American school; two others, predominantly white schools. Moreover, the graduates of an all white school (Roosevelt High School, North East I.S.D.) had a 43 percent

TABLE 2.2

DISTRIBUTIONS OF RESPONSES, NON-CONTACTS AND NON-RESPONSES OF 3045 GRADUATES IN 17 PUBLIC HIGH SCHOOLS IN 5 INDEPENDENT SCHOOL DISTRICTS FOR THE QUESTIONNAIRE SURVEY

| School District | High School | Responses | Non-Contacts | Non-Responses | Total Samples |
|---|---|---|---|---|---|
| Austin I.S.D. | Anderson[a] | 10 (17%) | 22 (37%) | 28 (47%) | 60 (101%)* |
| | Austin[b] | 27 (25%) | 21 (20%) | 58 (55%) | 106 (100%) |
| | Johnston[c] | 38 (41%) | 12 (13%) | 42 (46%) | 92 (100%) |
| | Lanier[b] | 26 (27%) | 9 (9%) | 61 (64%) | 96 (100%) |
| | Travis[b] | 34 (49%) | 14 (20%) | 22 (31%) | 70 (100%) |
| | District Total | 135 (32%) | 78 (18%) | 211 (50%) | 424 (100%) |
| North East I.S.D. | MacArthur[b] | 95 (41%) | 38 (16%) | 101 (43%) | 234 (100%) |
| | Roosevelt[b] | 59 (43%) | 26 (19%) | 51 (38%) | 136 (100%) |
| | District Total | 154 (42%) | 64 (17%) | 152 (41%) | 370 (100%) |
| San Antonio I.S.D. | Burbank[c] | 80 (31%) | 31 (12%) | 149 (57%) | 260 (100%) |
| | Highland[c] | 68 (37%) | 20 (11%) | 96 (52%) | 184 (100%) |
| | Lanier[c] | 65 (27%) | 53 (22%) | 122 (51%) | 240 (100%) |
| | District Total | 213 (31%) | 104 (15%) | 367 (54%) | 684 (100%) |
| Aldine I.S.D. | Aldine[b] | 60 (44%) | 8 (6%) | 68 (50%) | 136 (100%) |
| | Carver[a] | 39 (38%) | 4 (4%) | 61 (59%) | 104 (101%)* |
| | MacArthur[b] | 41 (29%) | 31 (22%) | 70 (49%) | 142 (100%) |
| | District Total | 140 (37%) | 43 (11%) | 199 (52%) | 382 (100%) |
| Houston I.S.D. | Kashmere[a] | 72 (31%) | 45 (20%) | 113 (49%) | 230 (100%) |
| | Sam Houston[b] | 149 (41%) | 61 (17%) | 154 (42%) | 364 (100%) |
| | Yegan[b] | 120 (33%) | 58 (16%) | 185 (51%) | 363 (100%) |
| | Wheatley[a] | 75 (33%) | 49 (21%) | 104 (46%) | 228 (100%) |
| | District Total | 416 (35%) | 213 (18%) | 556 (47%) | 1185 (100%) |
| | Grand Total | 1058 (35%) | 502 (16%) | 1485 (49%) | 3045 (100%) |

[a]The school had all black or predominantly black graduates in 1970.
[b]The school had all white or predominantly white graduates in 1970.
[c]The school had all Mexican-American or predominantly Mexican-American graduates in 1970.
*The sum of percentages within this school is unequal to 100 percent because of rounding error.

response rate with a 19 percent non-contact rate, whereas the graduates of a predominantly white school (Lanier High School, Austin I.S.D.) had a rather low response rate of 27 percent, with a small non-contact rate of 9 percent. Therefore, no clear-cut generalization can be provided for the response rates in this study.

Among 1,058 respondents, 60 of them reported that they had not worked for gainful employment since graduation from high school. The other 998 respondents had been employed since graduation from high school. However, 104 respondents who had had working experience did not complete some important items--especially Item 11 which deals with job title, income and employment length. Therefore, a final total of 894 returned questionnaires are considered as useful for data analysis in this study. These distributions of useful and useless questionnaires are tabulated in Table 2.3, as follows.

Characteristics of the Sample

Among the 894 high school graduates included in this study, there are 154 (17 percent) male vocational graduates, 224 (25 percent) male non-vocational graduates, 218 (24 percent) female vocational graduates, and 298 (33 percent) female non-vocational graduates. Female respondents are more than male respondents while non-vocational graduates are more than vocational graduates, as far as this sample is concerned.

TABLE 2.3

DISTRIBUTIONS OF RETURNED QUESTIONNAIRES ACCORDING TO SCHOOL DISTRICT AND USEFULNESS

| School Districts | Useless Questionnaires: Never Employed | Useless Questionnaires: Not Completed | Useful Questionnaires | Total Returned Questionnaires |
|---|---|---|---|---|
| Austin I.S.D. | 4 (3%) | 9 (7%) | 122 (90%) | 135 (100%) |
| North East I.S.D. | 13 (8%) | 10 (6%) | 131 (85%) | 154 (99%)* |
| San Antonio I.S.D. | 3 (1%) | 28 (13%) | 182 (85%) | 213 (99%)* |
| Aldine I.S.D. | 7 (5%) | 23 (16%) | 110 (79%) | 140 (100%) |
| Houston I.S.D. | 33 (8%) | 34 (8%) | 349 (84%) | 416 (100%) |
| Totals | 60 (6%) | 104 (10%) | 894 (84%) | 1058 (100%) |

*The sum of percentages within this district is unequal to 100 percent because of rounding error.

In terms of high school academic achievement, the high achievement group (top 30 percent) is less represented among vocational graduates than among non-vocational graduates when sex is taken into account. The high achievement group is less represented among male respondents than among female respondents when vocational education is taken into account. The reverse is true of the low achievement group (lower 30 percent) in both cases (see Table 2.4).

In terms of marital status, most of the respondents were not married at the time of the questionnaire survey. However, female vocational graduates deviated from the general pattern. Among them, the numbers of married and single respondents were nearly equal (also see Table 2.5).

In terms of ethnicity, the numbers of respondents among three ethnic groups were not balanced at all. White respondents consisted of slightly higher than 60 percent of the sample, while the rest of the respondents were equally divided for black and Mexican-American groups (also see Table 2.5).

In terms of social origin, the respondents with higher father's occupation were less than those with lower father's occupation. The numbers of respondents for three groups based on father's education were better balanced, although those with fathers having high school education were somewhat more than those in two other groups (see Table 2.4).

TABLE 2.4

DISTRIBUTIONS OF VOCATIONAL AND NON-VOCATIONAL HIGH SCHOOL GRADUATES OF BOTH SEXES ACCORDING TO ACADEMIC ACHIEVEMENT, MARITAL STATUS, ETHNICITY, FATHER'S OCCUPATION, FATHER'S EDUCATION, OR COLLEGE ATTENDANCE

| | | Male | | Female | | |
|---|---|---|---|---|---|---|
| | | Voc. Graduate | Non-Voc. Graduate | Voc. Graduate | Non-Voc. Graduate | Grand Total |
| Academic Ach. | High | 27 ( 18%) | 87 ( 39%) | 82 ( 37%) | 156 ( 52%) | 352 ( 39%) |
| | Middle | 61 ( 40%) | 92 ( 41%) | 97 ( 44%) | 96 ( 32%) | 346 ( 39%) |
| | Low | 66 ( 42%) | 45 ( 20%) | 39 ( 18%) | 46 ( 16%) | 196 ( 22%) |
| | Total | 154 (100%) | 224 (100%) | 218 ( 99%)* | 298 (100%) | 894 (100%) |
| Marital Status | Single | 103 ( 67%) | 169 ( 75%) | 111 ( 51%) | 211 ( 71%) | 594 ( 66%) |
| | Married | 51 ( 33%) | 55 ( 25%) | 107 ( 49%) | 87 ( 29%) | 300 ( 34%) |
| | Total | 154 (100%) | 224 (100%) | 218 (100%) | 298 (100%) | 894 (100%) |
| Ethnicity[a] | Black | 22 ( 15%) | 43 ( 20%) | 44 ( 20%) | 66 ( 22%) | 175 ( 20%) |
| | M. Am. | 32 ( 21%) | 44 ( 20%) | 46 ( 21%) | 50 ( 17%) | 172 ( 20%) |
| | White | 95 ( 64%) | 132 ( 60%) | 127 ( 59%) | 178 ( 61%) | 532 ( 61%) |
| | Total | 149 (100%) | 219 (100%) | 217 (100%) | 294 (100%) | 879 (101%)* |
| Father's Occup.[b] | High | 59 ( 39%) | 92 ( 41%) | 77 ( 36%) | 121 ( 42%) | 349 ( 40%) |
| | Low | 93 ( 61%) | 130 ( 59%) | 139 ( 64%) | 169 ( 58%) | 531 ( 60%) |
| | Total | 152 (100%) | 222 (100%) | 216 (100%) | 290 (100%) | 880 (100%) |
| Father's Educ.[c] | College | 37 ( 25%) | 70 ( 31%) | 47 ( 22%) | 108 ( 38%) | 262 ( 30%) |
| | H. Sch. | 61 ( 41%) | 94 ( 42%) | 95 ( 45%) | 90 ( 31%) | 340 ( 39%) |
| | E. Sch. | 52 ( 35%) | 59 ( 26%) | 70 ( 33%) | 89 ( 31%) | 270 ( 31%) |
| | Total | 150 (100%) | 223 (100%) | 212 (100%) | 287 (100%) | 872 (100%) |
| College Attend. | None | 98 ( 64%) | 86 ( 38%) | 163 ( 75%) | 146 ( 49%) | 493 ( 55%) |
| | 4 Mos. | 6 ( 4%) | 12 ( 5%) | 8 ( 4%) | 13 ( 4%) | 39 ( 4%) |
| | 9 Mos. | 6 ( 4%) | 9 ( 4%) | 7 ( 3%) | 17 ( 6%) | 39 ( 4%) |
| | 18 Mos. | 15 ( 10%) | 25 ( 11%) | 12 ( 6%) | 23 ( 8%) | 75 ( 8%) |
| | 24 Mos.+ | 29 ( 19%) | 92 ( 41%) | 28 ( 13%) | 99 ( 33%) | 248 ( 29%) |
| | Total | 154 (100%) | 224 ( 99%)* | 218 (101%)* | 298 (100%) | 894 (100%) |

[a] A total of 25 respondents did not report the information on ethnicity.

[b] A total of 14 respondents did not report the information on father's occupation.

[c] A total of 22 respondents did not report the information on father's education.

* A sum of percentages is unequal to 100 percent because of rounding error.

Moreover, there was a surprisingly high proportion of respondents who went to college for some time. A total of 45 percent of 894 respondents attended college from 4 months to more than 2 years. A total of 55 percent never went to college at all. Among the college-going respondents, vocational graduates were much less represented than were non-vocational graduates. The reverse was true for the non-college respondents (also see Table 2.4).

Finally, the variables such as academic achievement, father's occupation and father's education are defined in later chapters when they are taken into account for analysis. It is less feasible to illustrate these variables in this section.

Income and Length of Employment Surveyed

All amounts of income reported in different jobs for each of the 894 respondents are assumed to be gross salaries or wages before tax deductions unless otherwise specified by the respondents. Since 17 respondents reported their take-home income rather than gross income, their gross income is estimated on the basis of 5.2 percent for social security and 14.9 percent of income tax withheld for single workers or 12.9 percent income tax withheld for married workers. The percentages of income tax withheld used here are derived from the average of income tax withheld in 1971 and 1972 (for a gross monthly income of $400). Because most of the respondents report take-home monthly pay between $300

and $350, using the tax rate of gross monthly income of $400 will cause only limited marginal errors in estimating the gross income from take-home income.

Moreover, the length of employment included in the analysis was secured from a period of 27 months after graduation from high school, dating from June 1, 1970, until August 31, 1972. The respondents who returned the questionnaires during August 14-31, 1972, were presumed to have continued in their current jobs through August 31, 1972, unless they were not working at the time of responding to the questionnaire survey. For those who returned the questionnaires from September 1, 1972, until October 15, 1972, their employment occurring during that period of time was not included in the analysis. Therefore, the same period of 27 months after high school graduation was specified for all of the respondents in a study of their income and employment length.

Techniques of Data Analysis

There are two major statistical techniques which are used in this study--analysis of variance and multiple regression analysis. Since the major problem involved in this study is to compare the occupational achievement of vocational and non-vocational high school graduates, analysis of variance is most appropriate to serve this purpose. By means of this technique, all relevant variables (used as test factors) can be manipulated flexibly in various combi-

nations with the variable of vocational education, which is the main concern of the entire investigation. Moreover, this technique has another advantage in showing interaction effects of some independent variables included in this study. For instance, if male vocational graduates fare much better in occupational achievement than their male non-vocational counterparts, while female vocational graduates do not have advantageous edges over their female non-vocational counterparts, the analysis of variance may produce results which indicate vocational education is a significant variable in accounting for the income and the length of employment. On the other hand, the same results also may show that a significant interaction occurs between sex and vocational education. Vocational education, in this case, may have a strong positive association with occupational achievement of male graduates, but it may have no relationship with occupational achievement of female graduates.

However, multiple regression analysis plays an important complementary role in data analysis in this study. This technique is used to obtain information about the associations of test factors to secondary vocational education and occupational achievement of high school graduates. These associations serve as appropriate bases on which the test factors are controlled properly so as to facilitate the analysis of the relationship between secondary vocational education and the occupational achievement cited.

Moreover, analysis of principal components and orthogonal varimax rotation are used to provide the interpretation of the interrelationships among different indices of occupational achievement. But, these techniques are applied merely for a minor task which does not involve the relationship between secondary vocational education and occupational achievement of high school graduates, which is the main concern of this study.

## CHAPTER III

## TEST FACTORS AND THEIR ASSOCIATIONS WITH SECONDARY VOCATIONAL EDUCATION AND OCCUPATIONAL ACHIEVEMENT

In this chapter, the associations of test factors with secondary vocational education, and six indices of occupational achievement are presented. As mentioned in Chapter I, these associations might produce spurious relationships between secondary vocational education and occupational achievement of high school graduates. The test factors having strong associations with secondary vocational education and occupational achievement are more likely to be extraneous variables to these spurious relationships than the other test factors. Unless the former are controlled first in testing the relationships between secondary vocational education and occupational achievement, there is no point in controlling other test factors which are less likely to be extraneous variables. Therefore, the information presented in this chapter is used to formulate a proper order in which test factors are controlled so that the examination of genuine relationships between secondary vocational education and occupational achievement can be made possible.

Ten Test Factors for Vocational Education and Occupational Achievement

There are ten school-related and non-school-related variables included as test factors in this study. They are academic achievement, sex, marital status, ethnicity, father's occupation, father's education, community, business education, industrial arts, and college attendance. All of them were considered as potential extraneous variables to the relationships between vocational education and occupational achievement. These ten test factors were included as the predictor variables in linear multiple regression models to predict the vocational education criterion, as well as the six criterion indices of occupational achievement. The associations of each of ten test factors to each of seven criteria cited were secured from the results of multiple regression analyses.

Before the results of the multiple regression analyses are presented, the properties of the ten test factors involved should be explained. First of all, the measure of academic achievement used here was based on the accumulated scholastic ranking for four years of high school. The high school graduates who were among the top 30 percent in their high school classes were assigned to the "high" academic achievement group. Those among the lower 30 percent in their high school classes were assigned to the "low" academic achievement group. The remaining graduates were assigned to the group for "middle" academic achievement.

Sex, marital status, ethnicity, community, and college attendance are simpler than other test factors. The sex variable denotes the variations of being male or being female, while marital status denotes the variations of being married or being single. Ethnicity involves the variations of being white, black, or Mexican-American. Community differences deal with the variations of being graduated from high school in three different cities (Austin, San Antonio, or Houston).[1] College attendance means the length of time (in terms of months) during which a respondent went to college.

Father's occupation and father's education were based on the information secured from Items 2 and 3 in the returned questionnaires of this study (see Appendix B.1). There were five categories for the respondents to report the appropriate father's occupation. Those whose father's occupation belonged to one of the first three categories were assigned to the group for low father's occupation. Because there were very few respondents whose father's occupation applied to the first two categories, it was not feasible to separate those two categories from the third category. Those whose father's occupation were applicable to the other two categories were assigned to the group for high father's occupation. No further division of this group was feasible because of the small number of cases in the fifth category.

The grouping of respondents based on father's education also involved a consideration of the distributions of cases among the seven categories. Three groups were produced according to father's education. Those whose fathers finished the eighth grade or less were assigned to the group having fathers with elementary school education; those whose fathers had some high school or graduated from high school were assigned to the group having high school education; and, those whose fathers went to college or beyond were assigned to the group having fathers with college education.

Finally, business education and industrial arts are two areas of high school general education. The information about whether a respondent took any subjects in business education or industrial arts at high school was secured from Items 4 and 5 in the returned questionnaires (also see Appendix B.1). For the conveniences of data coding, six types of business education and five types of industrial arts were formed for this study. The six types of business education were general business, bookkeeping, shorthand, typing, business machine, and clerical practice (including office training, and stenographic practice). The five types of industrial arts were general industrial arts (including general shop), drafting, handicrafts, woodworking (including general woodshop), and other subjects related to electricity, radio, electronics, metalwork, or welding.

Among the ten test factors cited, college attendance was the only continuous variable. The other nine test factors were conceived as either nominal or ordinal variables. Each of them was coded as two or more dichotomous variables in the multiple regression analyses (see Appendix C for detailed illustrations of the coding of raw data for this study. As a result, there were 29 dichotomous variables and 1 continuous variable to represent the ten test factors as predictor variables in linear multiple regression analyses to predict vocational education and occupational achievement criteria.

Associations of Test Factors to Vocational Education, and Occupational Achievement

The associations of a test factor to secondary vocational education or occupational achievement criteria in linear multiple regression models represent the portion of total variance of secondary vocational education or an index of occupational achievement which is accounted for by this particular test factor. Whether this portion of variance accounted for is statistically significant or not depends upon the F-ratio secured from a significance test and its proper degrees of freedom in both numerator and denominator terms as indicated in Formula 3.1[2]:

$$F = \frac{(R_{1.0}^2 - R_{.9}^2)/(K_{1.0} - K_{.9})}{(1 - R_{1.0}^2)/(N - K_{1.0})} \qquad (3.1)$$

Where $R_{10}^2$ is a squared multiple correlation obtained from 10 test factors in a full model

$R_9^2$ is a squared multiple correlation obtained from 9 test factors in a reduced model (1 test factor taken away from the full model)

N is the number of respondents included in the analysis

$K_{10}$ is the number of predictors in the full model plus 1 (standing for a constant in the model)

$K_9$ is the number of predictors in the reduced model plus 1 (also standing for a constant in the model)

The term $R_{10}^2 - R_9^2$ produces the portion of variance accounted for by a test factor which is not included in the reduced model, while the term $K_{10} - K_9$ is used for the degree of freedom in the numerator term of F-ratio (also the numbers of predictors to stand for the test factor excluded from the reduced model). The term $1 - R_{10}^2$ stands for the portion of variance not accounted for by all 10 test factors, while $N - K_{10}$ is used for the degrees of freedom for the denominator term of F-ratio. The results of 7 multiple regression analyses represented in Tables 3.1 through 3.5 were secured by means of the significance test as indicated by Formula 3.1.

As indicated in Table 3.1, when secondary vocational education was used as the criterion to be accounted for by

TABLE 3.1

THE RESULTS OF 15 TEST FACTORS IN LINEAR MULTIPLE REGRESSION MODEL TO ACCOUNT FOR SECONDARY VOCATIONAL EDUCATION OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Test Factors | DFN | DFD | Portion of Variance | F-Ratio | Prob. |
|---|---|---|---|---|---|
| Academic Achievement[b] | 3 | 863 | .868 | 3.189 | .0227* |
| Sex[c] | 2 | 863 | .14 | .801 | ---- |
| Marital Status[c] | 2 | 863 | .73 | 4.070 | .0171* |
| Ethnicity[d] | 3 | 848 | .25 | .892 | ---- |
| Father's Occupation[e] | 2 | 849 | .04 | .218 | ---- |
| Father's Education[f] | 3 | 841 | .89 | 3.281 | .0224* |
| Community[f] | 3 | 863 | .76 | 2.811 | .0382* |
| Business Education[g] | 6 | 863 | 8.80 | 16.267 | .0000**** |
| Industrial Arts[g] | 5 | 863 | 2.49 | 5.530 | .0001**** |
| College Attendance[h] | 1 | 863 | 1.97 | 21.863 | .0000**** |

[a] A vocational graduate is coded as 1 while a non-vocational graduate is coded as 0; the multiple correlation of secondary vocational education to the 15 test factors is .4711; the probabilities larger than .10 are not listed in this table.

[b] Three dichotomous variables are used to code academic achievement (high, middle, and low).

[c] Two dichotomous variables are used to code marital status (single, and married), and sex (male, and female).

[d] Three dichotomous variables are used to code ethnicity (black, Mexican American, and white); 15 respondents failed to furnish the information for this item.

[e] Two dichotomous variables are used to code father's occupation (high, and low); 14 respondents failed to furnish the information for this item.

[f] Three dichotomous variables are used to code father's education (college, high school, and elementary school), and community (Austin, San Antonio, and Houston); 22 respondents did not furnish the information on father's education.

[g] Six dichotomous variables are used to code six types of business education taken at high school while five dichotomous variables are applied to five types of high school industrial arts.

[h] A continuous variable in terms of the number of months is used to code the length of college attendance.

* Significant at the .05 level
**** Significant at the .0001 level or beyond

test factors in a linear multiple regression model, it was coded as 1 or 0 depending upon whether a respondent was a vocational graduate or non-vocational graduate. A multiple correlation coefficient of .4711 was obtained from the relationship between secondary vocational education and a linear combination of 10 test factors. Therefore, 22.20 percent (the square of the multiple correlation coefficient of .4711, expressed as a percent) of the variance of being a vocational graduate or not was accounted for by the ten test factors.

Of the ten test factors, seven contributed significantly in accounting for secondary vocational education. College attendance, industrial arts, and business education, respectively, each accounted for from 1.97 percent to 8.80 percent of the total variance of secondary vocational education, and all of these three test factors were significant at the .0001 level or beyond in accounting for the variations of being a vocational graduate or a non-vocational graduate. Marital status, community, academic achievement, and father's education were significant at the .05 level in accounting for secondary vocational education. Three other predictors were not significant in accounting for whether or not a respondent was a vocational graduate.

As shown in Table 3.2, when the accumulated income of high school graduates was used as the criterion variable, its multiple correlation with ten test factors was .5522.

TABLE 3.2

THE RESULTS OF 10 TEST FACTORS IN LINEAR MULTIPLE REGRESSION MODEL TO ACCOUNT FOR ACCUMULATED INCOME AND MONTHLY EARNING OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Test Factors[d] | DFN | DFD | Accumulated Income[b] Portion of Variance | F-Ratio | Prob. | Monthly Earning[c] Portion of Variance | F-Ratio | Prob. |
|---|---|---|---|---|---|---|---|---|
| Academic Achievement | 1 | 863 | .49% | 2.036 | ---- | .37% | 1.007 | ---- |
| Sex | 2 | 863 | 3.35% | 20.790 | .0000**** | 5.03 | 28.750 | .0000**** |
| Marital Status | 2 | 863 | .85 | 5.253 | .0057** | .79 | 4.516 | .0112* |
| Ethnicity | 3 | 848 | 1.58 | 6.420 | .0005*** | .86 | 3.236 | .0214* |
| Father's Occupation | 2 | 849 | .30 | 1.850 | ---- | .20 | 1.145 | ---- |
| Father's Education | 3 | 841 | .21 | .869 | ---- | .26 | .982 | ---- |
| Community | 3 | 863 | 1.34 | 5.544 | .0012** | 3.36 | 12.806 | .0000**** |
| Business Education | 6 | 863 | 1.05 | 2.177 | .0426* | .73 | 1.373 | ---- |
| Industrial Arts | 5 | 863 | .84 | 2.095 | .0631 | 1.01 | 2.305 | .0422* |
| College Attendance | 1 | 863 | 11.31 | 140.472 | .0000**** | 3.24 | 17.044 | .0000**** |

[a]The results with probabilities larger than .10 are not listed in this table.

[b]The multiple correlation of accumulated income to the 10 test factors is .5222; therefore, 30.49 percent of the total variance of accumulated income is accounted for by the same test factors.

[c]The multiple correlation of monthly earning to the 10 test factors is .4954; therefore, 24.54 percent of the total variance of monthly earning is accounted for by the same test factors.

[d]Refer to the notes in Table 3.1 for the explanations of the 10 test factors.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

Thus, 30.49 percent of the total variance of accumulated income could be accounted for by a linear combination of these test factors. Sex, and college attendance were significant beyond the .0001 level in accounting for 3.35 percent and 11.31 percent, respectively, of total variance of the accumulated income criterion. Ethnicity was significant at the .001 level, while marital status, and community were significant at the .01 level, in accounting for the accumulated income. Business education was significant at the .05 level. However, four other test factors were not significant.

As further shown in Table 3.2, when the monthly earning of high school graduates was used as the criterion variable, its multiple correlation with a linear combination of ten test factors was .4954. A sum of 24.54 percent of total variance was accounted for by the ten test factors. College attendance, community, and sex were significant beyond the .0001 level, each accounting for from 3.24 percent to 5.03 percent of the total variance of the monthly earning. Marital status, ethnicity, and industrial arts were significant at the .05 level. Four other predictors were not significant in accounting for the monthly earning of high school graduates.

As indicated in Table 3.3, when the hourly rate of high school graduates was used as a criterion, its multiple correlation with a linear combination of ten test factors

TABLE 3.3

THE RESULTS OF 10 TEST FACTORS IN LINEAR MULTIPLE REGRESSION MODEL TO ACCOUNT FOR HOURLY RATE AND WEEKLY WORKING HOURS OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Test Factors[d] | DFN | DFD | Hourly Rate[b] Portion of Variance | F-Ratio | Prob. | Weekly Working Hours[c] Portion of Variance | F-Ratio | Prob. |
|---|---|---|---|---|---|---|---|---|
| Academic Achievement | 3 | 863 | .27% | .920 | ---- | .03% | .110 | ---- |
| Sex | 2 | 863 | 3.07 | 15.639 | .0000**** | 1.83 | 9.208 | .0003*** |
| Marital Status | 2 | 863 | 1.04 | 5.298 | .0055** | .03 | .130 | ---- |
| Ethnicity | 3 | 848 | .42 | 1.414 | ---- | .12 | .408 | ---- |
| Father's Occupation | 2 | 849 | .37 | 1.871 | ---- | .00 | .024 | ---- |
| Father's Education | 3 | 841 | .20 | .669 | ---- | .14 | .459 | ---- |
| Community | 3 | 863 | 3.22 | 10.949 | .0000**** | .11 | .375 | ---- |
| Business Education | 6 | 863 | .95 | 1.622 | ---- | .66 | 1.109 | ---- |
| Industrial Arts | 5 | 863 | .85 | 1.725 | ---- | .39 | .794 | ---- |
| College Attendance | 1 | 863 | .20 | 2.025 | ---- | 7.11 | 71.707 | .0000**** |

[a]The results with probabilities larger than .10 are not listed in this table.

[b]The multiple correlation of hourly rate to the 10 test factors is .3924; therefore, 15.40 percent of the total variance of hourly rate is accounted for by the same test factors.

[c]The multiple correlation of weekly working hours to the 10 test factors is .3801; therefore, 14.45 percent of the total variance of weekly working hours is accounted for by the same test factors.

[d]Refer to Table 3.1 for the explanation of the 10 test factors.

* Significant at the .01 level *** Significant at the .001 level
**** Significant at the .0001 level or beyond

was .3924; thus, only 15.40 percent of the total variance of the hourly rate variable was accounted for by the ten test factors. Only three test factors were significant predictors in accounting for the hourly rate of high school graduates. Both sex and community were significant beyond the .0001 level, each variable accounting for slightly over 3 percent of the total variance of the hourly rate. Marital status was significant at the .01 level, and accounted for about 1 percent of the same total variance. Seven other test factors were insignificant as predictors.

As also indicated in Table 3.3, when the weekly working hours variable was used as the criterion, the multiple correlation and its squared multiple correlation were .3801 and 14.45 percent, respectively. As in the case of the hourly rate, they were somewhat lower in comparison with the values obtained when secondary vocational education and four other indices of occupational achievement were used as the criteria. Sex and college attendance were significant at the .001 and beyond the .0001 level, respectively, accounting for 1.83 percent and 7.11 percent, respectively, of total variance of the weekly working hours. Eight other test factors were not significant in accounting for the same index.

As shown in Table 3.4, when the employed months variable was used as the criterion, its multiple correlation and the squared multiple correlation were .4535 and 20.57

TABLE 3.4

THE RESULTS OF 10 TEST FACTORS IN LINEAR MULTIPLE REGRESSION MODEL TO ACCOUNT FOR EMPLOYED MONTHS AND ACTUAL JOB LENGTH OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Test Factors[d] | DFN | DFD | Employed Months[b] Portion of Variance | F-Ratio | Prob. | Actual Job Length[c] Portion of Variance | F-Ratio | Prob. |
|---|---|---|---|---|---|---|---|---|
| Academic Achievement | 1 | 863 | .17% | .600 | ---- | .18% | .748 | ---- |
| Sex | 2 | 863 | .63 | 3.449 | .0312* | 1.27 | 7.966 | .0007*** |
| Marital Status | 2 | 863 | .12 | .652 | ---- | .06 | .392 | ---- |
| Ethnicity | 3 | 848 | 1.82 | 6.470 | .0005*** | 1.71 | 7.048 | .0003*** |
| Father's Occupation | 2 | 849 | .02 | .127 | ---- | .07 | .417 | ---- |
| Father's Education | 3 | 841 | .34 | 1.191 | ---- | .18 | .726 | ---- |
| Community | 3 | 863 | .07 | .261 | ---- | .06 | .246 | ---- |
| Business Education | 6 | 863 | 1.53 | 2.777 | .0112* | .82 | 1.720 | ---- |
| Industrial Arts | 5 | 863 | .58 | 1.251 | ---- | .80 | 2.020 | .0727 |
| College Attendance | 1 | 863 | 8.63 | 93.711 | .0000**** | 16.61 | 208.672 | .0000**** |

[a]The results with probabilities larger than .10 are not listed in this table.

[b]The multiple correlation of employed months to the 10 test factors is .4535; therefore, 20.57 percent of the total variance of employed months is accounted for by the same test factors.

[c]The multiple correlation of actual job length to the 10 test factors is .5596; therefore, 31.31 percent of the total variance of actual job length is accounted for by the same test factors.

[d]Refer to Table for the explanations of the 10 test factors.

* Significant at the .05 level *** Significant at the .001 level
**** Significant at the .0001 level or beyond

percent, respectively. Ethnicity and college attendance were significant at the .001 level and beyond the .0001 level in accounting for 1.82 percent and 8.63 percent, respectively, of the total variance of the employed months. Both sex and business education were significant at the .05 level while six other test factors were not significant in accounting for the same index.

Finally, as also shown in Table 3.4, when the actual job length variable was used as the criterion, its multiple correlation and the squared multiple correlation were .5596 and 31.31 percent, respectively, higher than those in the cases of secondary vocational education and other indices of occupational achievement. College attendance was significant beyond the .0001 level, accounting for 16.61 percent of total variance of the actual job length variable. Both sex and ethnicity were significant at the .001 level in accounting for 1.27 percent and 1.71 percent, respectively, of the same total variance. However, seven other test factors were not significant predictors for the same index.

Test Factors Having Higher Likelihood of Being Extraneous Variables

Based on a summary of the associations of ten test factors with secondary vocational education and each of six indices of occupational achievement, as shown in Table 3.5, there were five test factors which had significant common

TABLE 3.5

THE SUMMARY OF THE RESULTS OF SECONDARY VOCATIONAL EDUCATION, AND SIX INDICES OF OCCUPATIONAL ACHIEVEMENT TO BE ACCOUNTED FOR BY 10 TEST FACTORS IN LINEAR MULTIPLE REGRESSION MODELS FOR 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Test Factors | Secondary Vocational Education | Accumulated Income | Monthly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Actual Job Length |
|---|---|---|---|---|---|---|---|
| Academic Achievement | .0227* | ---- | ---- | ---- | ---- | ---- | ---- |
| Sex | ---- | .0000**** | .0000**** | .0000**** | .0003*** | .0112* | .0007*** |
| Marital Status | .0171* | .0057** | .0112* | .0055** | ---- | ---- | ---- |
| Ethnicity | ---- | .0005*** | .0214* | ---- | ---- | .0005*** | .0003*** |
| Father's Occupation | ---- | ---- | ---- | ---- | ---- | ---- | ---- |
| Father's Education | .0224* | ---- | ---- | ---- | ---- | ---- | ---- |
| Community | .0182* | .0012** | .0000**** | .0000**** | ---- | ---- | ---- |
| Business Education | .0000**** | .0426* | ---- | ---- | ---- | .0112* | ---- |
| Industrial Arts | .0001**** | .0631 | .0422* | ---- | ---- | ---- | .0727 |
| College Attendance | .0000**** | .0000**** | .0000**** | ---- | .0000**** | .0000**** | .0000**** |

[a]The results with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

association with secondary vocational education and at least one out of the six indices of occupational achievement. College attendance had the highest likelihood of being an extraneous variable, since it accounted for vocational education and five indices of occupational achievement (with an exception of the hourly rate) beyond the significance level of .0001. Next, community and marital status had a higher likelihood of being extraneous variables than did seven other test factors. Both of the two test factors cited had significant associations with secondary vocational education, accumulated income, monthly earning, and hourly rate at the .05 level or beyond. Business education and industrial arts were significant at the .0001 level or beyond in accounting for secondary vocational education, while both of them had at least significant associations with at least one of six indices of occupational achievement.

Academic achievement and father's education were significantly related to secondary vocational education at the .05 level, while they were not significant in accounting for any of six indices of occupational achievement. On the contrary, sex and ethnicity were significant at the .05 level or beyond in accounting for all or most of six indices of occupational achievement; but, they were not significantly related to being a vocational or non-vocational graduate. Finally, father's occupation, as used in this study, had no significant association with vocational education or with any of the six indices of occupational achievement.

Summary

There are ten test factors included in this study. They are academic achievement, sex, marital status, ethnicity, father's occupation, father's education, community, business education, industrial arts, and college attendance. All of them were considered as potential extraneous variables which might establish spurious relationships between vocational education on one hand, and six indices of occupational achievement on the other hand. The statistical technique of multiple regression analysis is used to examine possible common associations of each of these test factors to both vocational education and occupational achievement. The results indicated that college attendance was most likely to be an extraneous variable because it had strong common associations with vocational education and on the five of the six indices of occupational achievement. Next, community and marital status were two test factors which also had a high likelihood of being extraneous variables. Then, business education and industrial arts were two other test factors which had the properties of an extraneous variable. Finally, academic achievement, sex, ethnicity, and father's education had significant associations with either secondary vocational education or with one or more of the indices of occupational achievement. However, these associations were not common to both vocational education and occupational achievement.

## NOTES

[1]Great majorities of the respondents in this study were presumed to have obtained employment in the same cities where they had completed high school; among the respondents who were working at the time of replying to the questionnaire survey, 87 out of 91 graduated from high schools in Austin, 190 out of 218 graduated from high schools in San Antonio, and 311 out of 341 graduated in Houston were employed in the same cities where their high schools were located; 41 respondents were working in Texas cities other than the cities in which they graduated, 19 respondents were out of state, and 2 respondents were employed abroad.

[2]Formula 3.1 and its interpretations in this study are based on Donald J. Veldman's formula

$$F = \frac{(M_A^2 - M_B^2)/(K_A - K_B)}{(1 - M_A^2)/(N - K_A)}$$

and his ideas related to this formula; see his book Fortran Programming for the Behavioral Sciences (New York: Holt, Rinehart & Winston, 1967), pp. 297-98

## CHAPTER IV

## PRELIMINARY ANALYSIS OF EFFECTS OF SECONDARY VOCATIONAL EDUCATION

The effects of secondary vocational education in this study denote differences between vocational and non-vocational high school graduates in six indices of occupational achievement. The conception of "effects," as used herein, is better understood in terms of the connection between an independent variable and its dependent variable in mathematics. The effects of vocational education are the variations in occupational achievement (as a dependent variable) which are associated with the variations of being vocational or non-vocational graduates. The term "effects" does not necessarily imply the causal relationship between vocational education in high school and occupational achievement after high school.

In the present chapter, the findings secured from preliminary examination of the effects of secondary vocational education are discussed. The procedures for this preliminary analysis involved simultaneously controlling three test factors: sex, community, and college attendance. The results of the effects of these three test factors, which were secured by the technique of multiple regression

analysis presented in Chapter III and the technique of analysis of variance conducted in this chapter, were used to decide how the controlling procedures would be conducted in order to best produce preliminary findings of the effects of vocational education for the high school graduates in this study.

## Rationale for Selecting Sex, Community, and College Attendance as Control Variables in Preliminary Analysis

Based on the findings in Chapter III, the test factors which had the most significant associations with both secondary vocational education and the indices of occupational achievement of high school graduates, were college attendance, community, and marital status. But, sex differences were significantly related to all of the six indices of occupational achievement, although the sex variable was not significantly related to being a vocational or non-vocational graduate.

Because so many previous research findings have been reported separately for men and women, it was decided that the sex variable should be included among the control variables in the preliminary study. It was further decided that the college attendance variable should also be included, because it was significantly related to all but one of the six occupational achievement variables. Because of the distribution of cases, it was not feasible to control more than three test factors at a time; therefore, a choice had to be

made between the community and marital status variables. The community variable was chosen because it seemed logically to be of greater interest in terms of difference among the labor markets in three cities.

Before sex, community, and college attendance were controlled for the preliminary examination cited, the effects of each of these three test factors were analyzed separately for each of six indices of occupational achievement by the statistical technique of analysis of variance. The results obtained from these analyses were used as the bases on which the controlling procedures were decided upon, to serve more adequately the purpose of testing the effects of vocational education. Finally, for the testing of the effects of the three test factors cited, sex was broken down into two levels (male and female); community, three levels (Austin, San Antonio, and Houston); and, the length of college attendance, three levels (none, 4-18 months, and 24 months or longer).

Community Differences and Occupational Achievement

With community coded into three categories as described above, triple-classification analyses of variance, taking into account the community, sex, and college attendance variables, indicated significant community effects on three of the six occupational achievement variables. These results are shown in the first column of Tables 4.1-4.6. In

order to determine just where these community differences were, three additional triple-analyses of variance were computed for each criterion variable, one for each possible pair of communities. The results of these additional analyses are shown in the second, third, and last columns of Tables 4.1-4.6.

With sex, community, and college attendance taken into account, community differences were significant in accounting for accumulated income (at the .01 level), monthly earning (at the .001 level or beyond), and hourly rate (at the .001 level or beyond) when respondents from Houston were contrasted with respondents from either of the two other cities. But, no significant community differences were found for the same three indices of occupational achievement when the respondents from Austin were contrasted with those from San Antonio (see Tables 4.1, 4.2, and 4.3).

Moreover, there were no significant effects (at the .05 level) due to community differences as far as weekly working hours and actual job length were concerned, when respondents from all three communities were contrasted simultaneously.

Furthermore, the mean values shown in Table 4.7 indicate that, when significant community effects were found, the average Houston respondent fared better than the average respondent from either Austin or San Antonio. In

TABLE 4.1

EFFECTS OF COMMUNITY, SEX DIFFERENCES, AND COLLEGE ATTENDANCE ON ACCUMULATED INCOME OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Effects | Austin vs. San Antonio vs. Houston | Austin vs. San Antonio | Austin vs. Houston | San Antonio vs. Houston |
|---|---|---|---|---|
| Community | .0027** | ---- | .0038** | .0029** |
| Sex | .0000**** | .0048** | .0004*** | .0000**** |
| College Attendance | .0000**** | .0000**** | .0000**** | .0000**** |
| Community x Sex | ---- | ---- | ---- | .0135* |
| Community x College | ---- | ---- | ---- | .0860 |
| Sex x College | ---- | ---- | ---- | .0692 |
| Community x Sex x College | ---- | ---- | ---- | ---- |

[a]The results of analyses with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.2

EFFECTS OF COMMUNITY, SEX DIFFERENCES, AND COLLEGE ATTENDANCE ON MONTHLY EARNING OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Effects | Austin vs. San Antonio vs. Houston | Austin vs. San Antonio | Austin vs. Houston | San Antonio vs. Houston |
|---|---|---|---|---|
| Community | .0001**** | ---- | .0004*** | .0000**** |
| Sex | .0000**** | .0004*** | .0000**** | .0000**** |
| College Attendance | .0001**** | .0012** | .0008*** | .0000**** |
| Community x Sex | .0098** | ---- | ---- | .0004*** |
| Community x College | ---- | ---- | ---- | ---- |
| Sex x College | ---- | ---- | ---- | ---- |
| Community x Sex x College | ---- | ---- | ---- | ---- |

[a]The results of analyses with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.3

EFFECTS OF COMMUNITY, SEX DIFFERENCES, AND COLLEGE ATTENDANCE ON HOURLY RATE OF 864 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Effects | Austin vs. San Antonio vs. Houston | Austin vs. San Antonio | Austin vs. Houston | San Antonio vs. Houston |
|---|---|---|---|---|
| Community | .0002*** | --- | .0004*** | .0000**** |
| Sex | .0002*** | .0746 | .0010*** | .0000**** |
| College Attendance | --- | --- | --- | .0000**** |
| Community x Sex | --- | --- | --- | --- |
| Community x College | .0246* | --- | .0186* | .0051** |
| Sex x College | --- | --- | --- | --- |
| Community x Sex x College | --- | --- | --- | --- |

[a]The results of analyses with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.4

EFFECTS OF COMMUNITY, SEX DIFFERENCES, AND COLLEGE ATTENDANCE ON WEEKLY WORKING HOURS OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Effects | Austin vs. San Antonio vs. Houston | Austin vs. San Antonio | Austin vs. Houston | San Antonio vs. Houston |
|---|---|---|---|---|
| Community | ---- | ---- | ---- | ---- |
| Sex | .0000**** | .0009*** | .0001**** | .0000**** |
| College Attendance | .0000**** | .0006*** | .0000**** | .0000**** |
| Community x Sex | ---- | ---- | ---- | ---- |
| Community x College | ---- | ---- | ---- | ---- |
| Sex x College | .0044** | .0101* | .0142* | ---- |
| Community x Sex x College | ---- | ---- | .0808 | ---- |

[a]The results of analyses with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.5

EFFECTS OF COMMUNITY, SEX DIFFERENCES, AND COLLEGE ATTENDANCE ON EMPLOYED MONTHS OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Effects | Austin vs. San Antonio vs. Houston | Austin vs. San Antonio | Austin vs. Houston | San Antonio vs. Houston |
|---|---|---|---|---|
| Community | .0568 | .0472* | .0911 | ---- |
| Sex | .0903 | ---- | ---- | .0109* |
| College Attendance | .0000**** | .0000**** | .0000**** | .0000**** |
| Community x Sex | ---- | ---- | ---- | ---- |
| Community x College | ---- | .0949 | ---- | ---- |
| Sex x College | ---- | ---- | ---- | ---- |
| Community x Sex x College | ---- | ---- | ---- | ---- |

[a]The results of analyses with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.6

EFFECTS OF COMMUNITY, SEX DIFFERENCES, AND COLLEGE ATTENDANCE ON ACTUAL JOB LENGTH OF 894 HIGH SCHOOL GRADUATES IN TEXAS[a]

| Effects | Austin vs. San Antonio vs. Houston | Austin vs. San Antonio | Austin vs. Houston | San Antonio vs. Houston |
|---|---|---|---|---|
| Community | .0733 | .0796 | .0797 | ---- |
| Sex | .0008*** | .0402* | .0035** | .0001**** |
| College Attendance | .0000**** | .0000**** | .0000**** | .0000**** |
| Community x Sex | ---- | ---- | ---- | ---- |
| Community x College | .0700 | .0664 | ---- | ---- |
| Sex x College | ---- | ---- | ---- | ---- |
| Community x Sex x College | ---- | ---- | ---- | ---- |

[a]The results of analyses with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.7

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 894 HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX, AND COLLEGE ATTENDANCE

| Community Area | Sex | College Attendance | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|
| Austin | M | None | 22 | $ 8304 | $2885 | $377.5 | $ 76.9 | $2.15 | $ .43 |
| | | 4-18 Mos. | 7 | 5036 | 4917 | 300.8 | 135.8 | 1.95 | .74 |
| | | 24 Mos.+ | 8 | 2501 | 1497 | 308.7 | 80.5 | 1.85 | .49 |
| | F | None | 61 | 6495 | 3220 | 316.3 | 80.4 | 1.94 | .44 |
| | | 4-18 Mos. | 7 | 3070 | 1492 | 292.6 | 90.4 | 1.86 | .13 |
| | | 24 Mos.+ | 17 | 3615 | 2798 | 218.6 | 120.7 | 1.81 | .52 |
| San Antonio | M | None | 63 | 8011 | 4438 | 371.7 | 133.7 | 2.25 | .87 |
| | | 4-18 Mos. | 36 | 5722 | 3044 | 325.8 | 122.1 | 2.01 | .72 |
| | | 24 Mos.+ | 46 | 4136 | 4415 | 317.3 | 152.1 | 2.06 | 1.11 |
| | F | None | 77 | 6061 | 2977 | 305.2 | 82.1 | 1.84 | .38 |
| | | 4-18 Mos. | 36 | 4711 | 2411 | 292.5 | 86.6 | 1.87 | .35 |
| | | 24 Mos.+ | 56 | 3097 | 2262 | 253.5 | 112.6 | 1.95 | .86 |
| Houston | M | None | 100 | 10979 | 6195 | 488.6 | 208.3 | 2.75 | 1.00 |
| | | 4-18 Mos. | 30 | 7549 | 4033 | 438.9 | 175.6 | 2.51 | .60 |
| | | 24 Mos.+ | 67 | 4556 | 3482 | 388.2 | 187.2 | 2.52 | .89 |
| | F | None | 171 | 6750 | 3532 | 318.6 | 95.9 | 2.10 | .60 |
| | | 4-18 Mos. | 37 | 4748 | 3207 | 310.5 | 80.0 | 1.96 | .43 |
| | | 24 Mos.+ | 54 | 2915 | 2492 | 254.3 | 96.8 | 2.00 | .95 |

TABLE 4.7 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 89¢ HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX, AND COLLEGE ATTENDANCE

| Community Area | Sex | College Attendance | No. of Cases | Weekly Working Hours Mean | Weekly Working Hours S.D. | Employed Months Mean | Employed Months S.D. | Actual Job Length Mean | Actual Job Length S.D. |
|---|---|---|---|---|---|---|---|---|---|
| | M | None | 33 | 41.16 Hrs. | 3.54 Hrs. | 22.09 Mos. | 6.15 Mos. | 22.68 Mos. | 6.50 Mos. |
| | | 4-18 Mos. | 7 | 35.39 | 4.55 | 14.29 | 7.87 | 12.95 | 8.03 |
| | | 24 Mos.+ | 8 | 39.75 | 7.28 | 8.78 | 5.10 | 8.42 | 4.71 |
| Austin | F | None | 61 | 38.54 | 7.16 | 19.93 | 7.67 | 19.49 | 8.59 |
| | | 4-18 Mos. | 7 | 35.24 | 9.24 | 11.79 | 6.63 | 9.49 | 4.16 |
| | | 24 Mos.+ | 17 | 28.12 | 11.28 | 11.63 | 9.74 | 7.96 | 7.66 |
| | M | None | 62 | 39.56 | 7.30 | 20.60 | 7.33 | 20.72 | 8.50 |
| | | 4-18 Mos. | 36 | 38.48 | 9.66 | 17.90 | 7.93 | 16.91 | 8.66 |
| San | | 24 Mos.+ | 46 | 36.81 | 11.98 | 13.11 | 8.28 | 11.07 | 6.77 |
| Antonio | F | None | 77 | 38.40 | 6.11 | 19.14 | 7.48 | 18.91 | 8.22 |
| | | 4-18 Mos. | 36 | 36.31 | 7.24 | 16.88 | 8.02 | 14.81 | 7.15 |
| | | 24 Mos.+ | 56 | 30.98 | 9.72 | 11.06 | 8.41 | 9.40 | 6.17 |
| | M | None | 100 | 41.48 | 5.78 | 21.86 | 6.43 | 22.60 | 7.19 |
| | | 4-18 Mos. | 30 | 40.54 | 9.43 | 18.18 | 8.20 | 17.62 | 8.02 |
| | | 24 Mos.+ | 67 | 35.95 | 10.14 | 12.85 | 8.00 | 10.49 | 6.12 |
| Houston | F | None | 171 | 37.95 | 5.44 | 19.47 | 6.60 | 18.34 | 7.87 |
| | | 4-18 Mos. | 37 | 36.98 | 5.44 | 14.57 | 7.89 | 13.43 | 7.11 |
| | | 24 Mos.+ | 54 | 30.96 | 9.15 | 11.78 | 7.00 | 8.67 | 5.65 |

other words, the former earned more than the latter in accumulated income, monthly earning, and hourly rate.

Finally, the validity of these results was supported by the findings in other surveys. The 1970 census data showed that the 1969 annual income of high school graduates of 18-24 years old was substantially higher in the Houston Standard Metropolitan Statistical Area (SMSA) in comparison with the same income index of the equivalent group of people in either the Austin SMSA or the San Antonio SMSA when community, sex differences, and educational attainment (college attendance) were taken into account (refer to Table 4.8 for the actual income figures). And, the area wage surveys conducted in 1972 by the U. S. Bureau of Labor Statistics indicated that the weekly earning in the same type of employment was higher in the Houston SMSA than in the San Antonio SMSA. In the sample of order clerks, for a 40-hour work week, male clerks earned $148 in the Houston SMSA in April, 1972, and $109 in the San Antonio SMSA in May, 1972. For 39.5 hours per week, female clerks received $107.5 in the Houston SMSA in April, 1972, and $91 in the San Antonio SMSA in May, 1971.[1] If these weekly earnings were transformed into the figures of monthly earnings and hourly rates, exactly the same community differences would be produced.

Sex Differences and Occupational Achievement

As sex, community, and college attendance were taken into account in triple-classification analyses of

TABLE 4.8

THE 1969 ANNUAL INCOME OF PERSONS 16-24 YEARS OLD WHO COMPLETED 4 YEARS OF HIGH SCHOOL AND 1-3 YEARS OF COLLEGE IN AUSTIN, SAN ANTONIO AND HOUSTON STANDARD METROPOLITAN STATISTICAL AREAS

| Sex | Educational Attainment | Austin SMSA | San Antonio SMSA | Houston SMSA |
|---|---|---|---|---|
| Male | High School 4 Yrs | $2776 | $3055 | $4357 |
| | College 1-3 Yrs | 2431 | 2789 | 3877 |
| Female | High School 4 Yrs | $2479 | $2472 | $2733 |
| | College 1-3 Yrs | 1849 | 2317 | 2681 |

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: Detailed Characteristics, pc(1)-D45, Texas, Sec. 2 (Washington, D.C.: Government Printing Office, 1972), pp. 2139, 2149 and 2151.

variance (See Tables 4.1-4.6), sex differences were significant in accounting for accumulated income (at the .01 level or beyond), monthly earning (at the .001 level or beyond), weekly working hours (at the .001 level or beyond), and actual job length (at the .05 level or beyond) when all of three cities or any two of the three cities were included for testing.

Sex effects on the hourly rate did not reach the significance level of .05 when only Austin and San Antonio were contrasted. But, sex differences were significant at the .001 level or beyond when Houston was contrasted with either or both of the other two cities (see Table 4.3). In addition, sex differences in employed months were significant at the .05 level when the respondents in San Antonio were contrasted only with those in Houston, while these significant sex effects disappeared when Austin was included with either or both of the other two other cities for testing (see Table 4.5).

All of the significant sex effects cited above indicate that male respondents earned higher income, worked more hours per week, and stayed in jobs longer in comparison with female workers (see Table 4.7). There was not a single exception to this assertion whenever significant sex effects appeared.

Effects of College Attendance and Occupational Achievement

As the same three test factors were taken into account, the length of college attendance was significant beyond the .0001 level in accounting for accumulated income, employed months, and actual job length (see Tables 4.1, 4.3 and 4.6). It was significant at the .01 level or beyond in accounting for the monthly earning, and at the .001 level or beyond in accounting for the weekly working hours (see Tables 4.2 and 4.4). However, college attendance made no significant differences at all for the hourly rate received by both college-going and non-college high school graduates in this study (see Table 4.5).

What the cited effects of college attendance implied is that due to college education the working college students had less time for gainful employment than the non-college working youths in the same high school class. Almost certainly, because of class attendance and homework, the average college student had a restricted number of hours per week available for jobs, and very likely was kept from taking a job for consecutive months. Thus it seems reasonable to find that working college students had, on the average, shorter actual job length, less monthly earning and less accumulated income than did the non-college respondents, although no significant effects of college attendance were found on hourly rate (refer to Table 4.7).

Interaction Effects--Community x Sex, and Sex x College Attendance

Along with the effects due to sex differences, community differences, and different lengths of college attendance, there were two types of significant interaction effects on some indices of occupational achievement. The interaction between community and sex was significant at the .05 level or beyond in accounting for accumulated income in one of the subsamples, and both monthly earning, and hourly rate when the total sample or some subsamples were included for testing. Also, the interaction between sex and college attendance was significant at the .05 level or beyond in accounting for the weekly working hours for the total sample and two of the three subsamples.

More specifically, an interaction between community and sex was significant in accounting for the accumulated income of the respondents from San Antonio and Houston combined (see Table 4.1). The same type of interaction was significant at the .001 level in accounting for the monthly earning of the respondents from the same two cities combined. When the Austin respondents were included, the statistical significance was reduced from the .001 level to the .01 level (see Table 4.2). Moreover, this interaction was significant at the .05 level or beyond in accounting for the hourly rate when Houston was included with either or both of two other cities (see Table 4.3). Finally, the interaction

between sex and college attendance was significant at the .05 level or beyond in accounting for the weekly working hours when Austin was included with either or both of two other cities (see Table 4.4).

For the above interactions between community and sex, the explanation is that the differences in accumulated income, monthly earning and hourly rate due to community effects were greater for male respondents than for female respondents. In other words, the differences in the three indices of income between the male respondents from Houston on one side and the male respondents from Austin and/or San Antonio on the other side, were more likely larger than the differences in the same three indices between the female respondents of the same two sides (refer to Table 4.7). These results are consistent with the findings secured from the 1970 census (refer to Table 4.8) and the 1972 wage surveys in the Houston and San Antonio SMSAs cited earlier in this chapter.

As for the interaction between sex and college attendance for the weekly working hours, the explanation is that sex differences were larger among the working college students who attended college for two years or longer than among the high school graduates who either never went to college or attended college for 4 months up to 18 months. In the former group, the sex differences ranged from 4.99 to 11.61 hours per week while no more than 3.56 hours per week could be found for the differences between the two sexes in the latter two groups (also refer to Table 4.7).

Method of Controlling Community, Sex, and College Attendance

Based on the results of the triple classification analyses of variances reported in previous sections, community, sex, and college attendance were all significant at the .05 level or beyond in accounting for the accumulated income and the monthly earning variables when the respondents from all of the three cities were included for testing. Both community and sex were significant at the .05 level or beyond in accounting for the hourly rate; and both sex and college attendance were significant at the .05 level or beyond in accounting for the actual job length. Nevertheless, when only the respondents from Austin and San Antonio were included in the analyses, the community effects were not significant at the .05 level in accounting for five out of six of the indices of occupational achievement. The only exception was the weekly working hours which was barely accounted for at the significance level of .05 by the community effects.

Therefore, sex, community, and college attendance had to be controlled in the following manner: two levels (male and female) for sex, two levels (Austin-San Antonio and Houston) for community, and three levels (none, 4-18 months, and 24 months or longer) for college attendance. Sex and college attendance were handled in exactly the same way as they were for triple-classification analyses of variance in previous sections. Community differences were

handled in a modified way: that is, two separate community areas were formed to substitute for three separate cities. Although the differences in weekly working hours between Austin and San Antonio reached the significance level of .05, they did not produce significant differences in accumulated income, monthly earning, employed months, or actual job length. Moreover, there were 122 respondents from Austin, 313 from San Antonio, and 459 from Houston. The merging of the respondents from Austin and San Antonio facilitated data analyses because almost equivalent numbers of cases in two community areas were more likely subject to the same method of controlling additional test factors than were unbalanced numbers of cases in three cities.

The method of controlling test factors used in this study is identical to that suggested by Rosenberg. A test factor is controlled when it is stratified and broken down into several categories. Rosenberg illustrates that this process creates "contingent associations," in which the relation between two variables may disappear if this relation is due to a third variable (test factor).[2] But, since six indices of occupational achievement were conceived as interval scales instead of nominal or ordinal scales, the technique of analysis of variance is preferable to chi square analysis, which is an appropriate technique for testing the contingent associations.

Preliminary Findings of Effects of Vocational Education

When community, sex differences, and college attendance were controlled by the method stated in the last section, 12 groups of graduates were formed. Within each of these groups, vocational graduates were compared with non-vocational graduates on all of the six indices of occupational achievement used in this study. In this way, the relationship established between vocational education and occupational achievement could not be attributed to any of the three controlled variables (test factors) cited. A single-classification analysis of variance was used to test the differences in occupational achievement between vocational and non-vocational graduates.[3] Based on the results secured from this analysis, shown in Tables 4.9-4.11, secondary vocational education was significant at the .05 level or beyond in accounting for several indices of occupational achievement for both male and female non-college high school graduates; but, it was significant for working college students only in the case of female students on the hourly rate variable.

Working College Students. For both male and female respondents who went to college for 4-18 months or two years or longer, vocational education did not make any significant differences in the six indices of occupational achievement, with one exception--that female college students (two years

TABLE 4.9

EFFECTS OF VOCATIONAL EDUCATION ON SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 894 HIGH SCHOOL GRADUATES IN TEXAS WHEN COMMUNITY, SEX DIFFERENCES AND COLLEGE ATTENDANCE ARE CONTROLLED[A]

| Community | College Attendance | Sex | Accumulated Income | Monthly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Actual Job Length |
|---|---|---|---|---|---|---|---|---|
| Austin-San Antonio Area | None | Male | .0249* | ---- | ---- | ---- | .0007*** | .0004*** |
| | | Female | .0420* | .0914 | ---- | .0176* | .0996 | .0297* |
| | 4-18 Hos. | Male | ---- | ---- | ---- | ---- | ---- | ---- |
| | | Female | ---- | ---- | ---- | ---- | ---- | ---- |
| | 24 Hos.+ | Male | ---- | .0931 | ---- | ---- | ---- | ---- |
| | | Female | ---- | ---- | ---- | .0919 | ---- | ---- |
| Houston Area | None | Male | .0092** | .0111* | .0149* | ---- | ---- | ---- |
| | | Female | ---- | ---- | ---- | ---- | ---- | ---- |
| | 4-18 Hos. | Male | ---- | ---- | ---- | ---- | ---- | ---- |
| | | Female | ---- | ---- | ---- | ---- | ---- | ---- |
| | 24 Hos.+ | Male | ---- | ---- | ---- | ---- | ---- | ---- |
| | | Female | ---- | ---- | .0159* | ---- | ---- | ---- |

[A]The results with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 4.10

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 435 HIGH SCHOOL GRADUATES FROM AUSTIN-SAN ANTONIO AREA ACCORDING TO SEX DIFFERENCES, COLLEGE ATTENDANCE, AND VOCATIONAL EDUCATION

| Sex | College Attendance | Vocational Education | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|
| Male | None | Vocational | 48 | $8697 | $3269 | $372.5 | $111.4 | $2.14 | $ .55 |
| | | Non-Voc. | 36 | 6818 | 4355 | 367.0 | 123.2 | 2.29 | .95 |
| | 4-18 Mos. | Vocational | 20 | 5893 | 3036 | 324.3 | 156.3 | 1.97 | .71 |
| | | Non-Voc. | 23 | 5364 | 3656 | 319.4 | 88.2 | 2.03 | .73 |
| | 24 Mos.+ | Vocational | 18 | 3736 | 2387 | 270.2 | 86.7 | 1.82 | .25 |
| | | Non-Voc. | 36 | 3973 | 4821 | 339.9 | 160.6 | 2.13 | 1.26 |
| Female | None | Vocational | 73 | 6749 | 3126 | 321.0 | 73.3 | 1.91 | .43 |
| | | Non-Voc. | 65 | 5696 | 2958 | 297.9 | 88.3 | 1.86 | .39 |
| | 4-18 Mos. | Vocational | 18 | 4388 | 2600 | 280.1 | 54.3 | 1.80 | .21 |
| | | Non-Voc. | 25 | 4484 | 2213 | 296.6 | 102.0 | 1.92 | .39 |
| | 24 Mos.+ | Vocational | 14 | 3107 | 2895 | 230.9 | 113.4 | 2.14 | 1.28 |
| | | Non-Voc. | 59 | 2956 | 4276 | 248.8 | 115.6 | 1.87 | .61 |

TABLE 4.10 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 435 HIGH SCHOOL GRADUATES FROM AUSTIN-SAN ANTONIO AREA ACCORDING TO SEX DIFFERENCES, COLLEGE ATTENDANCE, AND VOCATIONAL EDUCATION

| Sex | College Attendance | Vocational Education | No. of Cases | Weekly Working Hours Mean | Weekly Working Hours S.D. | Employed Months Mean | Employed Months S.D. | Actual Job Length Mean | Actual Job Length S.D. |
|---|---|---|---|---|---|---|---|---|---|
| Male | None | Vocational | 48 | 40.76 Hrs | 6.29 Hrs | 23.09 Mos | 4.79 Mos | 23.72 Mos | 6.24 Mos |
| | | Non-Voc. | 36 | 38.88 | 6.77 | 17.72 | 8.49 | 17.35 | 8.76 |
| | 4-18 Mos. | Vocational | 20 | 37.51 | 10.02 | 18.53 | 6.76 | 17.52 | 8.10 |
| | | Non-Voc. | 23 | 38.35 | 8.35 | 16.25 | 8.86 | 15.17 | 9.03 |
| | 24 Mos.+ | Vocational | 18 | 34.28 | 7.70 | 14.28 | 8.04 | 11.97 | 7.50 |
| | | Non-Voc. | 36 | 38.72 | 12.70 | 11.57 | 7.94 | 10.03 | 6.00 |
| Female | None | Vocational | 73 | 39.67 | 5.65 | 20.60 | 7.79 | 20.61 | 8.34 |
| | | Non-Voc. | 65 | 37.07 | 7.23 | 18.49 | 7.16 | 17.55 | 8.15 |
| | 4-18 Mos. | Vocational | 19 | 36.73 | 5.34 | 15.72 | 8.97 | 14.02 | 7.78 |
| | | Non-Voc. | 25 | 35.71 | 8.80 | 16.28 | 7.35 | 13.90 | 6.55 |
| | 24 Mos.+ | Vocational | 14 | 26.27 | 9.98 | 13.39 | 11.06 | 8.48 | 7.65 |
| | | Non-Voc. | 59 | 31.27 | 9.97 | 12.57 | 8.13 | 9.20 | 6.47 |

TABLE 4.11

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 459 HIGH SCHOOL GRADUATES FROM HOUSTON AREA ACCORDING TO SEX DIFFERENCES, COLLEGE ATTENDANCE, AND VOCATIONAL EDUCATION

| Sex | College Attendance | Vocational Education | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|
| Male | None | Vocational | 48 | $12809 | 07528 | 0544.3 | 0257.3 | 03.00 | 01.19 |
| | | Non-Voc. | 50 | 9496 | 4537 | 637.8 | 135.4 | 3.51 | .73 |
| | 4-18 Hos. | Vocational | 9 | 8402 | 4282 | 307.9 | 93.8 | 3.36 | .53 |
| | | Non-Voc. | 23 | 6917 | 3958 | 449.3 | 192.4 | 3.58 | .61 |
| | 24 Hos.+ | Vocational | 10 | 4273 | 3044 | 354.3 | 173.3 | 3.31 | .69 |
| | | Non-Voc. | 57 | 4606 | 3576 | 394.1 | 190.4 | 3.55 | 1.04 |
| Female | None | Vocational | 91 | 6638 | 3438 | 343.6 | 91.9 | 3.08 | .51 |
| | | Non-Voc. | 80 | 6879 | 3652 | 333.0 | 100.5 | 3.12 | .69 |
| | 4-18 Hos. | Vocational | 13 | 4059 | 2963 | 283.6 | 86.5 | 1.81 | .36 |
| | | Non-Voc. | 28 | 4756 | 3262 | 313.5 | 75.6 | 1.99 | .44 |
| | 24 Hos.+ | Vocational | 10 | 2481 | 1759 | 283.1 | 96.6 | 2.68 | 1.90 |
| | | Non-Voc. | 40 | 3058 | 2720 | 248.2 | 100.9 | 1.86 | .49 |

TABLE 4.11 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF 459 HIGH SCHOOL GRADUATES FROM HOUSTON AREA ACCORDING TO SEX DIFFERENCES, COLLEGE ATTENDANCE, AND VOCATIONAL EDUCATION

| Sex | College Attendance | Vocational Education | No. of Cases | Weekly Working Hours Mean | S.D. | Employed Months Mean | S.D. | Actual Job Length Mean | S.D. |
|---|---|---|---|---|---|---|---|---|---|
| Male | None | Vocational | 48 | 43.25 Hrs | 6.17 Hrs | 23.00 Mos | 5.99 Mos | 21.97 Mos | 6.29 Mos |
| | | Non-Voc. | 50 | 40.84 | 5.44 | 21.24 | 6.35 | 21.80 | 7.48 |
| | 4-10 Mos. | Vocational | 9 | 40.11 | 3.04 | 20.11 | 7.39 | 20.33 | 7.73 |
| | | Non-Voc. | 31 | 40.51 | 10.77 | 16.98 | 8.67 | 15.86 | 8.09 |
| | 24 Mos.+ | Vocational | 10 | 34.39 | 10.20 | 14.60 | 9.05 | 11.01 | 5.78 |
| | | Non-Voc. | 97 | 36.22 | 10.20 | 12.54 | 7.84 | 10.40 | 6.22 |
| Female | None | Vocational | 91 | 30.51 | 4.43 | 18.77 | 7.88 | 18.10 | 7.78 |
| | | Non-Voc. | 80 | 37.31 | 6.37 | 20.26 | 9.33 | 18.61 | 8.01 |
| | 4-10 Mos. | Vocational | 13 | 36.04 | 5.26 | 14.08 | 7.60 | 13.17 | 8.33 |
| | | Non-Voc. | 28 | 36.95 | 5.68 | 14.00 | 7.39 | 12.93 | 6.94 |
| | 24 Mos.+ | Vocational | 10 | 29.41 | 11.82 | 9.00 | 6.85 | 6.61 | 5.25 |
| | | Non-Voc. | 40 | 31.07 | 8.80 | 12.49 | 7.11 | 9.15 | 5.68 |

or longer) who took vocational education in high school got a higher average hourly rate than their non-vocational counterparts who had no vocational training. However, this advantage in average hourly rate on the part of female vocational graduates who went to college did not amount to a higher average monthly earning or accumulated income (see Tables 4.9-4.11).

Non-College High School Graduates from Austin-San Antonio Area. Male non-college vocational graduates had higher means of employed months and actual job length (both significant at the .001 level) than those of their non-vocational counterparts in the Austin-San Antonio area. Female non-college vocational graduates were better off in weekly working hours and actual job length (both significant at the .05 level) in the same community area. The longer lengths of employment of vocational graduates of both sexes corresponded to their higher averages in accumulated income (significant at the .05 level) where the Austin-San Antonio area was concerned (see Tables 4.9-4.11).

In terms of actual figures (Table 4.11), the means of employed months and actual job length for male vocational graduates were 21.19 months and 23.72 months, respectively. The means of these two indices were 17.72 months and 17.35 months in the same order for male non-vocational graduates. The means of accumulated income were $5637 and $7113 for male vocational and non-vocational graduates, respectively.

As for the female non-college respondents, the means of weekly working hours and actual job length were 39.67 hours and 21.61 months for vocational graduates, and 37.17 hours and 17.55 months for non-vocational graduates. Finally, the means of accumulated income were $6743 and $5634 for female vocational and non-vocational graduates, respectively.

However, for both male and female respondents from the Austin-San Antonio area, the secondary vocational variable was not significant at the .10 level in accounting for the monthly earning and the hourly rate. Higher mean accumulated income of vocational graduates was not much related to the pay rates they received. Rather, it might be more related to their actual job length and/or two other indices of length of employment (weekly working hours and employed months).

Non-College High School Graduates from the Houston Area. For the male non-college respondents, vocational graduates had a higher mean monthly earning and higher mean hourly rate (both significant at the .05 level) than those of non-vocational graduates. These advantages in male vocational graduates in pay rates also corresponded to their higher average accumulated income (significant at the .10 level). However, no significant differences were found between female non-college vocational and non-vocational graduates in the same three indices of occupational achievement in the Houston area (see Table 4.3 and 4.11).

For male respondents from the Houston area, as the significant effects of vocational education cited were reported in actual figures, vocational graduates had $3.00 and $544.3, respectively, for mean hourly rate and mean monthly earning, while non-vocational graduates had $2.51 and $437.9, respectively, for the same two indices. The means of accumulated income were $12,809 and $9,496 for male vocational and non-vocational graduates, respectively. In all three indices of income, male vocational graduates fared substantially better than non-vocational graduates (refer to Table 4.11).

Nevertheless, for both male and female non-college graduates, vocational education was not significant at the .05 level in accounting for the weekly working hours, the employed months, and the actual job length. All these three indices were the variables for length of employment (see Table 4.9).

Summary of Preliminary Findings of Effects of Vocational Education. Based on the above results, preliminary findings of the effects of vocational education are stated as follows: First, vocational education graduates who were available for employment a total of 27 months were better off in gainful employment than non-vocational graduates, among non-college workers, with the exception of female graduates from the Houston area. However, this was not

so at all among college students who joined the labor force while attending college.

Second, the advantages of non-college vocational graduates differed between the two community areas. Vocational education was associated with length of employment in the Austin-San Antonio area whereas it was associated with pay rates in the Houston area (for male graduates only).

Third, although unable to significantly account for both employment lengths and pay rates simultaneously, vocational education was successful in accounting for the accumulated income of non-college workers in both sexes in the Austin-San Antonio area, and that of male non-college workers in the Houston area.

Finally, as discussed in Chapter I and shown in Appendix A.4, accumulated income of high school graduates was related more to employed months and hourly rate than to weekly working hours--the three factorically pure indices of occupational achievement. It is a logical deduction, therefore, that vocational education must be significant in accounting for employed months and/or hourly rate if vocational education makes any real differences in accumulated income at all.

Summary

Three test factors--community, sex, and college attendance--were chosen to be controlled in preliminary

analysis because they had strong significant associations with occupational achievement and/or secondary vocational education. As the process of controlling the three factors was carried out, secondary vocational education was found to have no significant associations with the occupational achievement of female non-college workers in the Houston area, as well as all groups of working college students. However, secondary vocational education was significant at the .05 level or beyond in accounting for the accumulated income as far as non-college workers of both sexes in the Austin-San Antonio area, and male non-college workers in the Houston area, were concerned. Significant effects of secondary vocational education were found on the employed months of male non-college workers, the weekly working hours of female non-college workers, and the actual job length of non-college workers of both sexes in the Austin-San Antonio area. Moreover, these significant effects also were found on the monthly earning and the hourly rate of male non-college workers in the Houston area. Therefore, the effects of secondary vocational education were significant at the .05 level or beyond in accounting for some of six indices of occupational achievement of non-college workers, depending upon sex and community differences.

## NOTES

[1]See U.S. Department of Labor, Bureau of Labor Statistics, Area Wage Survey: The Houston, Texas, Metropolitan Area, April 1972, Bulletin 1725-79 (1972), Table A-1, pp. 6-7 and Area Wage Survey: The San Antonio, Texas, Metropolitan Area, May, 1972, Bulletin 1725-67, Table A-1, p. 6.

[2]A brief discussion of the method of controlling a variable is presented in The Logic of Survey Analysis by Morris Rosenberg (New York: Basic Books, Inc., Publishers, 1968), pp. 23-27.

[3]A single-classification analysis of variance with vocational and non-vocational graduates as two groups is equivalent to the t test for them as two independent groups; see Donald J. Veldman, Fortran Programming for the Behavioral Sciences (New York: Holt, Rinehart and Winston, 1967), p. 247.

# CHAPTER V

## FURTHER EXAMINATION OF EFFECTS OF SECONDARY VOCATIONAL EDUCATION

Preliminary findings presented in Chapter III indicated that vocational education was significant in accounting for some indices of occupational achievement of non-college workers, but not for the indices of occupational achievement of working college students, with a single exception. Thus, there was no point in further analyzing the information on college students. Further testing of the effects of secondary vocational education was, therefore, limited to the 493 respondents who never went to college.

In this chapter, the findings from further testing were reported in a way that results secured by controlling marital status and ethnicity were presented first, followed by results obtained from controlling, in turn, such test factors as father's occupation, father's education, and academic achievement. The reason for marital status and ethnicity being considered first was that they were the test factors which were more likely than the other three to be extraneous variables because of their significant common association with both secondary vocational education and some

indices of occupational achievement of high school graduates, as reported in Chapter III.

Although business education and industrial arts were found to have significant associations with secondary vocational education and some indices of occupational achievement, it was not feasible to include them as independent variables in analysis in this chapter. There were two reasons for omitting the two test factors in further analysis of effects of secondary vocational education: Since each of them consisted of five or six dichotomous variables, there were technical difficulties in considering either of them as an independent variable in the analysis of variance. Besides, no information about the two areas of curriculum was secured from the project schools. Therefore, there were no grounds on which these two test factors could be handled in proper ways in order to fit the statistical technique used in this chapter. However, both business education and industrial arts were possibly important variables in the investigation of the relationship between secondary vocational education and occupational achievement of high school graduates.

For convenience of data analysis, male and female respondents were combined when effects of test factors in this chapter were taken into account. In other words, sex also was controlled as were each of the other test factors, and was handled by three-way classification analysis of variance.

Effects of Secondary Vocational Education with Marital Status Taken into Account

Marital status was not a significant variable in any of the indices of income and employment length for high school graduates from the Austin-San Antonio area. However, it was highly significant at the .001 level in accounting for accumulated income, monthly earning and hourly rate of the Houston graduates. It was quite possible that the significant effects of marital status on the accumulated income of high school graduates from the Houston area were related to pay rates rather than employment lengths. However, the effects of marital status on the occupational achievement in the Houston area applied to male graduates to a much greater extent than to female graduates. Male married vocational graduates earned 136 percent of the accumulated income of male single vocational graduates. The ratio of accumulated income of male married non-vocational graduates to male single non-vocational graduates was as high as 168 percent. These ratios of male married workers to male single workers were 132 percent to 142 percent, and 124 percent to 139 percent, in that order, as monthly earnings and hourly rates were considered. Nevertheless, the differences in income between married and single women was negligible at best (see Tables 5.1 and 5.2).

As marital status was taken into account, the effects of vocational education remained basically unchanged when income and employment lengths of high school graduates

were considered. First, secondary vocational education was significant at the .05 level in accounting for the accumulated income of high school graduates from both the Austin-San Antonio area and the Houston area. For the Austin-San Antonio graduates, effects of secondary vocational education were quite clear-cut for both sexes. Regardless of whether they were married or single, vocational graduates had a higher accumulated income than non-vocational graduates of the same sex. For the Houston graduates, effects of secondary vocational education operated in a somewhat complicated way. Beneficial consequences of secondary vocational education were not present for women. These benefits were shown for men as vocational graduates were compared with non-vocational graduates of the same marital status. These sex differences in the effectiveness of secondary vocational education led to a statistically significant interaction between sex and secondary vocational education at the .05 level.

Second, the effects of secondary vocational education on accumulated income were related to its effects on employed months and actual job length (significant at the .01 level) for the graduates from Austin-San Antonio, while favorable effects of secondary vocational education were related to monthly earning and hourly rate (significant at the .01 and .05 levels, respectively) in the Houston area. These findings were consistent with the results in other analyses in this study.

## TABLE 5.1

### EFFECTS OF SEX DIFFERENCES, VOCATIONAL EDUCATION, AND MARITAL STATUS ON SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS[a]

| Community Area | Effects | Accumulated Income | Monthly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Actual Job Length |
|---|---|---|---|---|---|---|---|
| Austin-San Antonio | Sex | .0032** | .0000**** | .0005*** | .0260* | ---- | ---- |
| | Voc Education | .0205* | ---- | ---- | .0552 | .0029** | .0050** |
| | Marital Status | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc Ed | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Marital | ---- | ---- | ---- | .0304* | ---- | ---- |
| | Voc Ed x Marital | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc Ed x Marital | ---- | .0577 | ---- | ---- | ---- | ---- |
| Houston | Sex | .0000**** | .0000**** | .0000**** | .0000**** | .0106* | .0000**** |
| | Voc Education | .0353* | .0028** | .0354* | .0607 | ---- | ---- |
| | Marital Status | .0003*** | .0002*** | .0005*** | ---- | ---- | .0808 |
| | Sex x Voc Ed | .0120* | .0142* | .0151* | ---- | ---- | ---- |
| | Sex x Marital | .0005*** | .0001*** | .0001*** | ---- | ---- | ---- |
| | Voc Ed x Marital | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc Ed x Marital | ---- | ---- | ---- | ---- | ---- | ---- |

[a]The results with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 5.2

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION AND MARITAL STATUS

| Community Area | Sex | Vocational Education | Marital Status | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | Voc. | M | 16 | $ 8428 | $2826 | $359.1 | $ 81.5 | $2.02 | $ .43 |
| | | Graduate | S | 32 | 8832 | 3505 | 379.2 | 124.4 | 2.19 | .61 |
| Austin- | M | Non-Voc. | M | 6 | 7702 | 1661 | 435.7 | 100.4 | 2.42 | .46 |
| San | | Graduate | S | 30 | 6641 | 4714 | 353.2 | 124.1 | 2.27 | 1.02 |
| Antonio | F | Voc. | M | 39 | 6252 | 3352 | 322.4 | 69.0 | 1.96 | .37 |
| | | Graduate | S | 34 | 7319 | 2786 | 319.4 | 78.9 | 1.85 | .49 |
| | F | Non-Voc. | M | 21 | 5853 | 3200 | 290.3 | 98.2 | 1.89 | .38 |
| | | Graduate | S | 44 | 5621 | 2872 | 301.5 | 84.2 | 1.84 | .40 |
| | M | Voc. | M | 17 | 15092 | 10547 | 641.6 | 380.8 | 3.42 | 1.61 |
| | | Graduate | S | 33 | 11106 | 5191 | 486.5 | 131.5 | 2.76 | .78 |
| Houston | M | Non-Voc. | M | 17 | 12965 | 4373 | 544.4 | 147.0 | 3.09 | .82 |
| | | Graduate | S | 33 | 7709 | 3503 | 383.0 | 90.2 | 2.22 | .47 |
| | F | Voc. | M | 57 | 6677 | 3358 | 345.5 | 80.2 | 2.09 | .46 |
| | | Graduate | S | 34 | 6572 | 3619 | 340.3 | 109.9 | 2.07 | .58 |
| | F | Non-Voc. | M | 36 | 6981 | 3876 | 319.1 | 100.8 | 2.05 | .51 |
| | | Graduate | S | 43 | 6780 | 3542 | 344.5 | 101.1 | 2.17 | .82 |

TABLE 5.2 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION AND MARITAL STATUS

| Community Area | Sex | Vocational Education | Marital Status | No. of Cases | Weekly Working Hours Mean | Weekly Working Hours S.D. | Employed Months Mean | Employed Months S.D. | Actual Job Length Mean | Actual Job Length S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | Voc. | M | 16 | 41.70 Hrs | 5.91 Hrs | 23.22 Mos | 5.04 Mos | 24.28 Mos | 6.79 Mos |
| | | Graduate | S | 32 | 40.29 | 6.51 | 21.03 | 4.74 | 21.44 | 6.04 |
| Austin- | M | Non-Voc. | M | 6 | 41.90 | 2.65 | 18.83 | 6.71 | 19.41 | 6.16 |
| San | | Graduate | S | 33 | 38.28 | 7.20 | 17.50 | 8.88 | 16.94 | 9.22 |
| Antonio | F | Voc. | M | 35 | 38.85 | 5.62 | 18.67 | 8.32 | 18.33 | 8.41 |
| | | Graduate | S | 34 | 40.66 | 5.61 | 22.81 | 6.58 | 23.22 | 7.55 |
| | F | Non-Voc. | M | 21 | 35.60 | 8.85 | 19.07 | 6.84 | 17.65 | 8.51 |
| | | Graduate | S | 44 | 37.77 | 6.38 | 18.21 | 7.36 | 17.51 | 8.07 |
| | M | Voc. | M | 17 | 43.29 | 6.98 | 22.71 | 4.71 | 24.50 | 6.11 |
| | | Graduate | S | 33 | 41.53 | 5.58 | 22.36 | 7.34 | 22.83 | 7.26 |
| Houston | M | Non-Voc. | M | 17 | 41.22 | 3.55 | 23.71 | 3.74 | 24.43 | 4.38 |
| | | Graduate | S | 33 | 40.64 | 6.23 | 19.97 | 7.07 | 20.44 | 8.39 |
| | F | Voc. | M | 57 | 38.72 | 4.22 | 18.89 | 7.69 | 18.21 | 7.55 |
| | | Graduate | S | 34 | 38.15 | 4.79 | 18.57 | 8.30 | 17.92 | 8.26 |
| | F | Non-Voc. | M | 36 | 36.39 | 7.19 | 21.39 | 11.29 | 19.11 | 8.80 |
| | | Graduate | S | 43 | 38.01 | 5.64 | 19.28 | 7.44 | 18.11 | 7.44 |

Finally, gaps in income between vocational graduates and non-vocational graduates were wider when both were single. Effects of vocational education were less impressive for married graduates. For instance, the ratio of accumulated income of single male vocational graduates to single male non-vocational graduates was 133 percent and 144 percent for the Austin-San Antonio area and the Houston area, respectively, while the ratio of married male vocational graduates to married male non-vocational graduates was 109 percent and 116 percent in the same order. The female graduates from the Austin-San Antonio area followed the same pattern. Single vocational graduates earned 130 percent of the accumulated income of non-vocational graduates with the same marital status, while this ratio was only 107 percent for married women. However, female graduates from Houston were so insensitive to the effects of both vocational education and marital status that no real differences were shown by these two variables.

Effects of Vocational Education with Ethnicity Taken into Account

In the 1970 census of population, persons with Spanish surnames and origins (equivalent to Mexican-Americans in this study) were not considered as a race. The census information secured from these people was included in the category of Whites and Others. However, Mexican-Americans as well as blacks were a disadvantaged group as

far as income is concerned. Thus, there was a necessity to separate Mexican-Americans from whites in order to establish whether there were differences in income and length of employment between these two groups of people. Accordingly, in the questionnaire (Item 1) the respondents were asked for an identification in terms of one of three ethnic groups; that is, whites, Mexican-Americans, and blacks. Since race was not a desirable term to describe the criterion of grouping, it was called ethnicity in this study.

According to Wattenberg and Scammon[1], black family income went up by 99.6 percent, while white family income increased by 69 percent in the United States during the decade of 1961-1971. The faster rate of increase in black family income closed the income gap between black and white family income. In 1961 the ratio of black family income to white family income was 53 percent; in 1971 this ratio was up to 63 percent. However, in the South, the ratio of black family income to white family income was somewhat lower than the national average. It was 57 percent in the South as a whole in 1971.[2] It was 59.8 percent in Texas in 1969.[3] These figures reflected some progress toward equal distribution in income between blacks and whites. However, there has been a more dramatic change than the data show, because the income gap due to ethnic differences was much narrower among younger people than among the total labor force.

For the 1969 annual income of persons 18-24 years old, the black average income was 82 percent of the white average income, and the Mexican-American average was 84-85 percent of the white average. When those in the same age range who completed four years of high school were considered, black men and Mexican-American men earned 86 percent and 90 percent, respectively, of the average income of white men in 1969. The percentages for black women and Mexican-American women were 82 percent and 94 percent, respectively, in the same year (see Table 5.3). These findings were basically consistent with those presented later in this chapter.

In the Austin-San Antonio area, only white graduates and Mexican-American graduates were included in the analysis of the effects of ethnicity. Black non-college graduates were not taken into account because only 19 black respondents were available. Technically, these black graduates could have been included in the analysis, but generalizations would have been unsatisfactory because of the extremely small number of cases. For the same reason, the 15 Mexican-American graduates also were excluded from the analysis for the Houston area.

Secondary vocational education for non-college workers remained significant at the .05 level for both community areas in accounting for accumulated income when sex and ethnicity were simultaneously taken into account. Voca-

TABLE 5.3

INDIVIDUAL INCOME IN 1969 OF TEXANS 18-24 YEARS OLD ACCORDING TO SEX, ETHNICITY AND EDUCATIONAL ATTAINMENT

| Educational Attainment | Sex | White | Black | Mexican-American |
|---|---|---|---|---|
| All Educational Levels | Male | $3348 (100%) | $2759 (82%) | $2855 (85%) |
| | Female | 2250 (100%) | 1849 (82%) | 1892 (84%) |
| Four Years of High School | Male | 3632 (100%) | 3119 (86%) | 3285 (90%) |
| | Female | 2442 (100%) | 2006 (82%) | 2288 (94%) |

Source: U.S. Department of Commerce, Bureau of the Census, U.S. Census of Population: Detailed Characteristics (Washington, D.C.: Government Printing Office, 1972), pc 17-D45, Texas, Section 2, pp. 2121-22.

tional education was also significant in accounting for some other indices. It made significant differences in weekly working hours (at the .05 level), employed months (at the .001 level) and actual job length (at the .001 level) for the graduates from the Austin-San Antonio area; but, it was significant (at the .01 level) in accounting for the monthly earning of graduates from the Houston area (see Table 5.4). Therefore, different reasons should be given in the interpretation of why vocational education was significant in accounting for the accumulated income of high school graduates in the two community areas. Vocational graduates fared better in accumulated income than did non-vocational graduates because the former had a longer average length of employment than the latter in the Austin-San Antonio area. However, vocational graduates as a whole fared better in accumulated income than their non-vocational counterparts because of higher average monthly earning, rather than a higher average length of employment, in the Houston area. Moreover, it is important to pay attention to a significant interaction between sex and vocational education in accumulated income and monthly earning in the Houston area. It may be interpreted that only male vocational graduates had a higher achievement in accumulated income and monthly earning than their non-vocational counterparts (see Tables 5.4 and 5.5).

TABLE 5.4

EFFECTS OF SEX, VOCATIONAL EDUCATION, AND ETHNICITY ON SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS[a]

| Community Area | Effects | Accumulated Income | Monthly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Actual Job Length |
|---|---|---|---|---|---|---|---|
| Austin-San Antonio[b] | Sex | .0008*** | .0001*** | .0002*** | ---- | ---- | ---- |
| | Voc Education | .0106* | ---- | ---- | .0208* | .0006*** | .0002*** |
| | Ethnicity (White v. Mexican-Amer.) | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc Educ. | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Ethnicity | ---- | ---- | ---- | ---- | ---- | ---- |
| | Voc Ed. x Ethnicity | ---- | ---- | ---- | .0603 | ---- | ---- |
| | Sex x Voc x Ethn. | ---- | ---- | ---- | ---- | ---- | ---- |
| Houston[c] | Sex | .0000**** | .0000**** | .0000*** | .0002*** | .0008*** | .0000**** |
| | Voc Education | .0391* | .0069** | .0567 | ---- | ---- | ---- |
| | Ethnicity (White v. Mexican-Amer.) | .0048** | ---- | .0464* | ---- | .0001*** | .0002*** |
| | Sex x Voc Educ. | .0184* | .0185* | .0260* | ---- | ---- | ---- |
| | Sex x Ethnicity | .0413* | .0671 | ---- | ---- | .0209* | .0541 |
| | Voc Ed. x Ethnicity | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc x Ethn. | ---- | ---- | ---- | ---- | ---- | ---- |

[a]The probabilities larger than .10 are not listed.
[b]Black graduates are excluded from analysis owing to small number of respondents.
[c]Mexican-American graduates are excluded from analysis owing to small number of respondents.

* Significant at the .05 level
** Significant at the .01 level
*** Significant at the .001 level
**** Significant at the .0001 level

TABLE 5.5

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION, AND ETHNICITY

| Community Area | Sex | Vocational Education | Ethnicity | No. of Cases | Accumulated Income Mean | S.D. | Monthly Earning Mean | S.D. | Hourly Rate Mean | S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| Austin-San Antonio | M | Voc. | White | 21 | $ 8366 | $ 3476 | $368.8 | $118.1 | $2.15 | $ .45 |
| | | Graduate | Mexican Am. | 20 | 9428 | 3296 | 394.2 | 117.0 | 2.20 | .69 |
| | M | Non-Voc. | White | 14 | 8005 | 5535 | 400.7 | 152.1 | 2.44 | 1.17 |
| | | Graduate | Mexican Am. | 20 | 7131 | 4591 | 360.8 | 127.6 | 2.30 | .92 |
| | F | Voc. | White | 36 | 7017 | 3284 | 324.4 | 84.3 | 2.01 | .48 |
| | | Graduate | Mexican Am. | 30 | 7089 | 2667 | 324.5 | 61.4 | 1.85 | .36 |
| | F | Non-Voc. | White | 32 | 6229 | 2956 | 307.9 | 88.7 | 1.90 | .39 |
| | | Graduate | Mexican Am. | 24 | 5184 | 3072 | 298.9 | 89.7 | 1.88 | .37 |
| Houston | M | Voc. | White | 37 | 12777 | 5738 | 537.7 | 163.8 | 3.04 | .92 |
| | | Graduate | Black | 11 | 12443 | 12399 | 562.2 | 463.4 | 2.96 | 1.83 |
| | M | Non-Voc. | White | 27 | 10042 | 4444 | 444.8 | 140.5 | 2.55 | .74 |
| | | Graduate | Black | 16 | 9241 | 5333 | 441.8 | 153.8 | 2.55 | .82 |
| | F | Voc. | White | 63 | 7431 | 3288 | 364.7 | 88.5 | 2.19 | .52 |
| | | Graduate | Black | 25 | 4451 | 2802 | 294.6 | 76.6 | 1.82 | .39 |
| | F | Non-Voc. | White | 53 | 7957 | 3175 | 351.7 | 94.2 | 2.25 | .69 |
| | | Graduate | Black | 23 | 4336 | 3781 | 291.6 | 111.8 | 1.82 | .66 |

TABLE 5.5 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION, AND ETHNICITY

| Community Area | Sex | Vocational Education | Ethnicity | No. of Cases | Weekly Working Hours Mean | Weekly Working Hours S.D. | Employed Months Mean | Employed Months S.D. | Actual Job Length Mean | Actual Job Length S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| Austin-San Antonio | M | Voc. Graduate | White | 21 | 39.87 Hrs | 8.42 Hrs | 22.14 Mos | 5.26 Mos | 22.38 Mos | 7.05 Mos |
| | | | Mexican Am. | 20 | 41.94 | 3.40 | 23.93 | 3.93 | 25.17 | 5.09 |
| | M | Non-Voc. Graduate | White | 14 | 39.94 | 5.88 | 17.96 | 8.85 | 17.90 | 9.11 |
| | | | Mexican Am. | 20 | 38.12 | 7.79 | 19.05 | 8.61 | 18.60 | 9.36 |
| | F | Voc. Graduate | White | 36 | 38.14 | 6.31 | 21.06 | 7.56 | 20.42 | 7.93 |
| | | | Mexican Am. | 30 | 41.32 | 4.95 | 21.87 | 7.38 | 22.64 | 8.23 |
| | F | Non-Voc. Graduate | White | 32 | 37.21 | 6.10 | 19.34 | 7.00 | 18.46 | 7.63 |
| | | | Mexican Am. | 24 | 37.02 | 8.43 | 16.99 | 7.54 | 16.05 | 8.63 |
| Houston | M | Voc. Graduate | White | 37 | 41.47 | 4.55 | 23.09 | 5.36 | 23.95 | 6.02 |
| | | | Black | 11 | 42.05 | 5.54 | 21.50 | 8.56 | 22.39 | 8.99 |
| | M | Non-Voc. Graduate | White | 27 | 40.79 | 6.75 | 22.54 | 6.31 | 23.21 | 8.09 |
| | | | Black | 16 | 40.15 | 2.78 | 19.88 | 6.57 | 19.93 | 6.67 |
| | F | Voc. Graduate | White | 63 | 38.98 | 3.17 | 20.11 | 7.66 | 19.57 | 7.52 |
| | | | Black | 25 | 37.74 | 5.76 | 14.56 | 7.22 | 13.88 | 7.03 |
| | F | Non-Voc. Graduate | White | 53 | 36.90 | 6.71 | 22.80 | 8.51 | 20.64 | 6.70 |
| | | | Black | 23 | 37.96 | 6.11 | 14.07 | 9.18 | 13.37 | 9.07 |

Considering the effects of ethnicity, there were no significant differences between white and Mexican-American graduates in all six indices of occupational achievement in the Austin-San Antonio area. But, white graduates fared significantly better than black graduates in accumulated income (at the .01 level), hourly rate (at the .05 level), employed months (at the .0001 level), as well as actual job length (at the .001 level) in the Houston area. There were also significant interaction effects between sex and ethnicity in accumulated income and employed months in the Houston area. Based on the above information, ethnic differences in occupational achievement between white and black graduates were due to a differential length of employment more than differential pay rates. And, the disadvantages of black graduates in occupational achievement were due to the female groups rather than the male groups (also see Tables 5.4 and 5.5).

Effects of Secondary Vocational Education with Father's Occupation Taken into Account

Thomas considers income, occupational appeal, and worker qualification as the three major vertical dimensions of occupational structure.[4] Since no inquiry was made about father's income in the questionnaire survey, father's occupational prestige and education attainment were used as the two indices of social origin in this study. These two indices are close to Thomas' conceptions of occupational appeal and worker qualification.

Item 2 in the questionnaire consisted of five groups of occupational titles, in order from low prestige to high prestige. The five rated options for father's occupation were based on the 1963 scores and ranks of NORC occupations matched by the 1960 socioeconomic status of census occupations.[5] The cutoff points for the five groups of occupations were arbitrary, but with no overlapping in prestige scores and ranks. As the occupational titles were different between the NORC data and the census data, the more updated or commonly used titles were chosen, according to common sense judgment.

There were two advantages in the use of the father's occupational prestige as an index of social origin. The scale of occupational prestige is a uni-dimensioned continuum with no confusion of indistinctive overlapping and multi-dimensioned complication. As suggested by Reiss, this ordered scale of occupational prestige can be used to measure social status.[6] Furthermore, occupational prestige is highly stable in American society. According to a study conducted by Hodge, Siegel and Rossi, prestige ratings of occupations were very consistent during the four decades from 1925 until 1963. The associations of the 1963 NORC scores to the 1925 prestige ratings in Counts' study and to the 1947 NORC scores were as high as .934 and .990, respectively.[7] Since the prestige ratings of occupations are so stable, it was assumed that the ordered options of fathers'

occupations in this study were in all probability highly reliable, even though they were based on investigations made a decade earlier.

Since there were very few respondents whose father's occupation belonged to either of the two lowest categories, these respondents, plus the respondents in the third category, formed a group of low father's occupation for the convenience of statistical analysis. The respondents in the two highest categories, on the other hand, formed a group of high father's occupation. The difference in income and length of employment between these two groups was thus considered to be the effects of the father's occupational prestige.

As far as the Austin-San Antonio area was concerned, the father's occupation was not found to be a significant variable in accounting for income and employment length of high school graduates. Although there was significant interaction in hourly rate between sex and father's occupation, it did not amount to any interaction effect in accumulated income or monthly earning. However, father's occupation is significant at the .05 level in accounting for employed months and actual job length of high school graduates from the Houston area. Also, there were significant interactions at the .01 level between sex and father's occupation as accumulated income and pay rates were considered (see Tables 5.6 and 5.7).

TABLE 5.6

EFFECTS OF SEX DIFFERENCES, VOCATIONAL EDUCATION, AND FATHER'S OCCUPATION ON SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS[a]

| Community Area | Effects | Accumulated Income | Monthly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Actual Job Length |
|---|---|---|---|---|---|---|---|
| Austin-San Antonio | Sex | .0029** | .0001**** | .0001**** | ---- | ---- | ---- |
| | Voc Education | .0072** | ---- | ---- | .0021** | .0017** | .0002*** |
| | Father's Occup. | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Father's Occupation | ---- | ---- | .0631 | ---- | ---- | ---- |
| | Sex x Voc Ed | ---- | ---- | ---- | ---- | ---- | ---- |
| | Voc Ed x Father's Occup. | ---- | ---- | .0302* | .0693 | ---- | ---- |
| | Sex x Voc Ed x Father's Occup. | ---- | ---- | ---- | .0732 | ---- | ---- |
| Houston | Sex | .0000**** | .0000**** | .0000**** | .0000**** | ---- | .0016** |
| | Voc Education | .0105* | .0021** | .0246* | .0825 | ---- | ---- |
| | Father's Occup. | .0612 | ---- | ---- | ---- | .0403* | .0291* |
| | Sex x Father's Occupation | .0014** | .0038** | .0006*** | ---- | .0919 | ---- |
| | Sex x Voc Ed | ---- | ---- | ---- | ---- | ---- | ---- |
| | Voc Ed x Father's Occup. | .0989 | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc Ed x Father's Occup. | .0583 | ---- | .0078** | .0949 | ---- | ---- |

[a]The results with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 5.7

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION, AND FATHER'S OCCUPATION

| Community Area | Sex | Vocational Education | Father's Occup. | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| Austin-San Antonio | M | Voc. | Low | 35 | $ 8658 | $3420 | $366.8 | $114.6 | $2.15 | $ .59 |
| | | Graduate | High | 13 | 8802 | 2952 | 387.8 | 105.3 | 2.10 | .45 |
| | M | Non-Voc. | Low | 26 | 7277 | 5149 | 377.5 | 139.6 | 2.20 | .78 |
| | | Graduate | High | 10 | 7271 | 4358 | 365.4 | 126.1 | 2.67 | 1.40 |
| | F | Voc. | Low | 47 | 6847 | 3290 | 326.3 | 77.5 | 1.94 | .46 |
| | | Graduate | High | 25 | 6722 | 2812 | 314.5 | 64.8 | 1.85 | .38 |
| | F | Non-Voc. | Low | 40 | 5368 | 3014 | 294.9 | 93.8 | 1.83 | .42 |
| | | Graduate | High | 26 | 6226 | 2791 | 303.3 | 78.9 | 1.91 | .34 |
| Houston | M | Voc. | Low | 34 | 11618 | 7741 | 520.6 | 269.3 | 2.86 | 1.14 |
| | | Graduate | High | 16 | 14256 | 7150 | 578.9 | 218.1 | 3.25 | 1.21 |
| | M | Non-Voc. | Low | 36 | 10049 | 4807 | 454.1 | 144.3 | 2.62 | .76 |
| | | Graduate | High | 14 | 8074 | 3512 | 396.2 | 102.2 | 2.23 | .61 |
| | F | Voc. | Low | 63 | 6038 | 3386 | 332.1 | 83.6 | 2.03 | .43 |
| | | Graduate | High | 28 | 7986 | 3218 | 369.3 | 105.3 | 2.20 | .65 |
| | F | Non-Voc. | Low | 62 | 6385 | 3784 | 322.9 | 103.5 | 2.01 | .53 |
| | | Graduate | High | 17 | 8648 | 2645 | 369.5 | 85.0 | 2.52 | 1.03 |

TABLE 5.7 --CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION, AND FATHER'S OCCUPATION

| Community Area | Sex | Vocational Education | Father's Occup. | No. of Cases | Weekly Working Hours Mean | Weekly Working Hours S.D. | Employed Months Mean | Employed Months S.D. | Actual Job Length Mean | Actual Job Length S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | Voc. | Low | 35 | 40.02 Hrs | 6.81 Hrs | 23.27 Mos | 4.95 Mos | 23.51 Mos | 6.46 Mos |
| | | Graduate | High | 13 | 42.76 | 4.19 | 22.62 | 4.44 | 24.28 | 5.82 |
| Austin-San | M | Non-Voc. | Low | 26 | 40.14 | 4.66 | 18.15 | 8.55 | 18.34 | 8.67 |
| | | Graduate | High | 10 | 35.80 | 10.28 | 18.30 | 8.90 | 16.83 | 10.24 |
| Antonio | F | Voc. | Low | 47 | 39.84 | 6.60 | 20.50 | 8.18 | 20.66 | 8.81 |
| | | Graduate | High | 25 | 39.70 | 3.23 | 21.12 | 7.09 | 20.95 | 7.41 |
| | F | Non-Voc. | Low | 40 | 37.16 | 7.60 | 17.58 | 7.17 | 16.71 | 8.28 |
| | | Graduate | High | 26 | 39.97 | 6.72 | 19.94 | 6.69 | 18.91 | 7.75 |
| | M | Voc. | Low | 34 | 42.37 | 7.11 | 21.84 | 6.97 | 22.84 | 7.51 |
| | | Graduate | High | 14 | 41.61 | 3.04 | 23.84 | 5.37 | 24.59 | 5.30 |
| Houston | M | Non-Voc. | Low | 36 | 40.38 | 4.97 | 21.53 | 6.02 | 21.86 | 6.92 |
| | | Graduate | High | 14 | 42.00 | 6.56 | 20.50 | 7.35 | 21.62 | 9.03 |
| | F | Voc. | Low | 63 | 38.05 | 5.05 | 17.55 | 7.94 | 16.75 | 7.78 |
| | | Graduate | High | 28 | 39.55 | 2.25 | 21.52 | 7.14 | 21.15 | 6.99 |
| | F | Non-Voc. | Low | 62 | 37.56 | 6.24 | 19.38 | 10.05 | 17.85 | 8.28 |
| | | Graduate | High | 17 | 36.24 | 7.08 | 23.38 | 5.58 | 21.18 | 6.72 |

The relationship of vocational education to income and employment of high school graduates basically remained unchanged after the father's occupation was controlled. In the Austin-San Antonio area, significant effects of vocational education on accumulated income of high school graduates were related to its effects on all three indices of employment length. On the other hand, significant effects of vocational education in the Houston area were related to pay rates of graduates, since vocational graduates fared better than non-vocational graduates in both monthly earning and hourly rate, rather than length of employment. Male vocational graduates fared better in accumulated income than male non-vocational graduates wherever effects of the father's occupational prestige operated. It was apparent that male non-vocational graduates were unlikely to make up for a lack of vocational education by favorable family influences. On the contrary, female non-vocational graduates from supposedly more influential families scored even lower than those from less influential families. Finally, secondary vocational education had slight negative effects on the accumulated income of female graduates when the father's occupation was taken into account. However, these negative influences were so negligible that no significant interaction between sex and secondary vocational education appeared in accumulated income.

Effects of Vocational Education with Father's Education Taken into Account

Item 3 in the questionnaire consisted of seven categories of father's educational attainment, in order from elementary school to graduation from college and receipt of graduate degrees. In the analysis, three levels of father's educational attainment were used--elementary school, high school, and college or beyond. The level of elementary school covered the eighth grade and below; the level of high school included graduation from high school or some high school education; and the level of college or beyond applied to some college education, graduation from college and receipt of graduate degrees. This practice of reducing the number of categories was necessary to facilitate data analysis. Three-way analysis of variance was used in this chapter for non-college graduates in the Austin-San Antonio area and the Houston area, separately; too many categories of father's education would have given a very small number of cases to some cells, which stand for particular categories on the basis of a combination of sex, vocational education, and father's education. The means of these cells with small numbers of cases would have been very sensitive to sampling fluctuations. Even with only three categories for father's education, one cell out of twelve for the Austin-San Antonio area and two cells out of twelve for the Houston area had less than ten cases.

Father's education was significant at the .05 level in accounting for accumulated income, monthly earnings and hourly rates of non-college graduates from the Austin-San Antonio area. With the exception of male vocational graduates, respondents whose fathers had attended or graduated from high school fared better in the three indices cited than did the respondents whose fathers attended elementary school or college. However, none of six indices of occupational achievement were significantly accounted for by father's education in the Houston area (see Tables 5.8 and 5.9).

When father's education was taken into account, secondary vocational education significantly accounted for the accumulated income of high school graduates at the .01 level and .05 level, respectively, for the Austin-San Antonio and Houston areas. The effectiveness of vocational education in accounting for accumulated income improved from the .05 level in previous analyses to the .01 level in this analysis for the Austin-San Antonio area. However, the significance of secondary vocational education remained at the same level for the Houston graduates. The significant effects of secondary vocational education should be explained in terms of employment lengths rather than pay rates for the Austin-San Antonio graduates, but in terms of pay rates rather than employment lengths for the Houston graduates. Secondary vocational education was significant at the

TABLE 5.8

EFFECTS OF SEX DIFFERENCES, VOCATIONAL EDUCATION, AND FATHER'S EDUCATION ON SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS*

| Community Area | Effects | Recalculated Income | Hourly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Job Length |
|---|---|---|---|---|---|---|---|
| Austin-San Antonio | Sex | .002*** | .0002*** | .0004*** | .0171* | .0003*** | .0965 |
| | Voc Education | .0076*** | --- | --- | --- | --- | --- |
| | Father's Educ | .0191*** | .0126** | .0120** | --- | .0010 | --- |
| | Sex x Voc Ed | --- | --- | --- | --- | --- | --- |
| | Sex x Father's Education | --- | --- | --- | --- | --- | --- |
| | Voc Ed x Father's Education | --- | .0108* | .0058 | --- | --- | --- |
| | Sex x Voc Ed x Father's Educ | --- | --- | --- | --- | --- | --- |
| Houston | Sex | .0000**** | .0000**** | .0000**** | .0000**** | .0251* | .0002**** |
| | Voc Education | .0142** | .0060*** | .0218* | --- | --- | --- |
| | Father's Educ | --- | --- | --- | --- | --- | --- |
| | Sex x Voc Ed | .0041** | .0195* | .0117* | --- | .0775 | --- |
| | Sex x Father's Education | --- | --- | --- | --- | --- | --- |
| | Voc Ed x Father's Education | --- | --- | --- | --- | --- | --- |
| | Sex x Voc Ed x Father's Educ | --- | --- | --- | --- | --- | --- |

*The results with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level

*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 5.9

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION, AND FATHER'S EDUCATION

| Community Area | Sex | Vocational Education | Father's Education | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | Voc. | Element. | 18 | $ 9625 | $3475 | $402.9 | $124.1 | $2.27 | $ .74 |
| | | Graduate | High Sch. | 17 | 9577 | 2747 | 365.3 | 63.4 | 2.03 | .29 |
| | | | College | 13 | 7571 | 3466 | 339.8 | 137.3 | 2.09 | .53 |
| Austin-San Antonio | M | Non-Voc. | Element. | 15 | 6176 | 3384 | 327.3 | 90.3 | 2.20 | .91 |
| | | Graduate | High Sch. | 15 | 9151 | 5913 | 440.5 | 159.5 | 2.60 | 1.16 |
| | | | College | 6 | 5333 | 4249 | 325.4 | 98.3 | 2.00 | .65 |
| | F | Voc. | Element. | 25 | 6530 | 2826 | 317.9 | 65.9 | 1.81 | .35 |
| | | Graduate | High Sch. | 32 | 7132 | 3228 | 324.2 | 82.3 | 2.01 | .50 |
| | | | College | 16 | 6327 | 3467 | 319.4 | 69.4 | 1.86 | .40 |
| | F | Non-Voc. | Element. | 27 | 5369 | 2966 | 277.2 | 91.8 | 1.73 | .38 |
| | | Graduate | High Sch. | 21 | 6501 | 3193 | 336.2 | 89.5 | 2.11 | .37 |
| | | | College | 17 | 5220 | 1588 | 283.4 | 68.1 | 1.76 | .28 |
| | M | Voc. | Element. | 21 | 11394 | 5167 | 512.1 | 145.3 | 2.87 | .92 |
| | | Graduate | High Sch. | 21 | 14115 | 9136 | 568.9 | 343.7 | 3.10 | 1.42 |
| | | | College | 6 | 13191 | 8240 | 571.4 | 240.1 | 3.13 | 1.28 |
| Houston | M | Non-Voc. | Element. | 19 | 8876 | 3693 | 420.1 | 123.5 | 2.39 | .68 |
| | | Graduate | High Sch. | 22 | 9816 | 4893 | 435.9 | 138.8 | 2.60 | .74 |
| | | | College | 9 | 10024 | 5570 | 483.3 | 156.9 | 2.58 | .86 |
| | F | Voc. | Element. | 36 | 6938 | 3433 | 336.4 | 83.7 | 2.05 | .43 |
| | | Graduate | High Sch. | 40 | 6658 | 3613 | 344.8 | 88.7 | 2.10 | .52 |
| | | | College | 15 | 5863 | 3050 | 357.4 | 120.4 | 2.11 | .60 |
| | F | Non-Voc. | Element. | 36 | 6632 | 3827 | 321.4 | 107.2 | 2.13 | .90 |
| | | Graduate | High Sch. | 28 | 6699 | 3800 | 336.7 | 95.4 | 2.06 | .49 |
| | | | College | 16 | 7749 | 3012 | 352.6 | 96.1 | 2.18 | .41 |

TABLE 5.9 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION, AND FATHER'S EDUCATION

| Community Area | Sex | Vocational Education | Father's Education | No. of Cases | Weekly Working Hours Mean | S.D. | Employed Months Mean | S.D. | Actual Job Length Mean | S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| Austin-San Antonio | M | Voc. Graduate | Element. | 18 | 41.69 Hrs | 2.81 Hrs | 23.92 Mos | 4.03 Mos | 24.99 Mos | 4.89 Mos |
| | | | High Sch. | 17 | 42.09 | 4.82 | 23.24 | 5.15 | 24.39 | 6.06 |
| | | | College | 13 | 37.73 | 9.95 | 21.77 | 5.33 | 21.08 | 7.69 |
| | M | Non-Voc. Graduate | Element. | 15 | 37.16 | 8.69 | 18.60 | 7.98 | 17.76 | 8.63 |
| | | | High Sch. | 15 | 41.01 | 5.37 | 19.23 | 8.42 | 19.54 | 8.88 |
| | | | College | 6 | 38.17 | 3.32 | 14.58 | 10.56 | 14.27 | 10.71 |
| | F | Voc. Graduate | Element. | 25 | 41.12 | 5.84 | 20.64 | 8.23 | 21.27 | 9.21 |
| | | | High Sch. | 32 | 38.37 | 6.40 | 21.20 | 7.16 | 20.86 | 7.82 |
| | | | College | 16 | 40.11 | 2.61 | 19.31 | 8.62 | 19.09 | 8.25 |
| | F | Non-Voc. Graduate | Element. | 27 | 36.99 | 8.57 | 18.62 | 7.70 | 17.80 | 9.05 |
| | | | High Sch. | 21 | 36.98 | 6.51 | 18.71 | 6.94 | 17.69 | 7.57 |
| | | | College | 17 | 37.30 | 6.25 | 18.00 | 6.91 | 17.00 | 7.77 |
| Houston | M | Voc. Graduate | Element. | 21 | 42.79 | 8.44 | 21.83 | 7.15 | 22.80 | 7.44 |
| | | | High Sch. | 21 | 41.59 | 3.56 | 24.48 | 4.12 | 25.41 | 4.61 |
| | | | College | 6 | 42.69 | 4.41 | 21.91 | 6.97 | 23.02 | 7.05 |
| | M | Non-Voc. Graduate | Element. | 19 | 41.09 | 3.54 | 20.82 | 5.45 | 21.44 | 5.95 |
| | | | High Sch. | 22 | 39.41 | 6.84 | 21.95 | 6.55 | 21.90 | 8.29 |
| | | | College | 9 | 43.79 | 3.81 | 20.39 | 8.07 | 22.29 | 9.04 |
| | F | Voc. Graduate | Element. | 36 | 38.28 | 5.44 | 19.88 | 7.63 | 18.98 | 7.63 |
| | | | High Sch. | 40 | 38.36 | 4.08 | 18.63 | 8.03 | 17.94 | 7.84 |
| | | | College | 15 | 39.45 | 2.11 | 16.50 | 8.07 | 16.43 | 8.19 |
| | F | Non-Voc. Graduate | Element. | 36 | 36.65 | 7.93 | 20.03 | 10.58 | 17.94 | 7.97 |
| | | | High Sch. | 28 | 38.16 | 4.51 | 19.61 | 9.28 | 18.37 | 8.77 |
| | | | College | 16 | 37.30 | 5.27 | 21.94 | 6.22 | 20.52 | 6.78 |

.001 level in accounting for employed months and actual job length for the Austin-San Antonio area, and at the .01 level and .05 level in accounting for monthly earning and hourly rate for the Houston area. Moreover, secondary vocational education was more effective for men than for women in the Houston area, and this explained the interactions between sex and secondary vocational education when income was under consideration.

Except for male graduates whose father's education was at the high school level, vocational graduates had a higher accumulated income than non-vocational graduates in both sexes. Female vocational graduates earned from 10 percent to 22 percent more than female non-vocational graduates. Although female graduates were usually paid less than male graduates, male non-vocational graduates whose father's education was at either the elementary school level or college (or beyond) level had a lower accumulated income than female vocational graduates with a corresponding level of father's education.

Vocational Education with Academic Achievement Taken into Account

For each high school graduate selected to receive the questionnaire on occupational achievement in this study, his or her accumulated rank in the 1970 graduating class was secured from the student's high school. In view of the requirements for the practical manipulation of data analysis,

each respondent was assigned to one of three groups according to his or her academic percentile. The high achievement group consisted of graduates with percentiles of 70 or above. The low achievement group consisted of those with percentiles of 30 or below. The middle achievement group consisted of those with percentiles between 30 and 70. In other words, the top 30 percent formed the high achievement group; the middle 40 percent, the middle achievement group; while the bottom 30 percent formed the low achievement group. This grouping facilitated comparison of information on high school academic achievement and seemed the best way of handling high school academic achievement as a variable in accounting for occupational achievement after graduation, since no information about scores in standardized achievement tests were available for this study.

Since the selection of samples for the questionnaire survey involved matching vocational graduates with non-vocational graduates in terms of sex and academic achievement, there was hope that the number of vocational and non-vocational graduates would be comparable when sex, secondary vocational education, and academic achievement were taken into account. As far as non-college workers were concerned, this hope was approximately realized. There were reasonably balanced distributions of cases between vocational and non-vocational graduates in each appropriate category in both community areas (see Table 5.11).

The effects of high school academic achievement on accumulated income were significant at the .05 level for high school graduates from the Houston area. This was not the case for high school graduates from the Austin-San Antonio area. In the Houston area, the effects of academic achievement on the accumulated income of non-college graduates probably were related to effects on pay rates since academic achievement was significant in accounting for monthly earning and hourly rate at the .01 level and the .05 level, respectively. Although academic achievement had a significant effect on hourly rate for the Austin-San Antonio area, these effects were not transformed into significant effects on accumulated income and monthly earning (see Tables 5.10 and 5.11).

The pattern in which academic achievement operated for non-college graduates from the Houston area was not clear-cut. Generally, the high achievement group fared better in accumulated income than the middle achievement group which, in turn, earned a higher income than the low achievement group. However, there were two exceptions--in male non-vocational graduates in the high achievement group and female non-vocational graduates in the low achievement group.

With academic achievement taken into account, the effects of vocational education basically remained the same for high school graduates from the Austin-San Antonio area, whose accumulated income was not significantly accounted for

TABLE 5.10

EFFECTS OF SEX DIFFERENCES, VOCATIONAL EDUCATION, AND ACADEMIC ACHIEVEMENT ON SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS[a]

| Community Area | Effects | Accumulated Income | Monthly Earning | Hourly Rate | Weekly Working Hours | Employed Months | Actual Job Length |
|---|---|---|---|---|---|---|---|
| Austin-San Antonio | Sex | .0015** | .0000**** | .0000**** | ---- | ---- | ---- |
| | Voc Education | .0230* | ---- | ---- | .0030** | .0064** | .0009*** |
| | Academic | ---- | ---- | .0080** | ---- | ---- | ---- |
| | Sex x Voc Education | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Academic | ---- | ---- | .0263* | .0162* | ---- | ---- |
| | Voc x Academic | ---- | ---- | ---- | ---- | ---- | ---- |
| | Sex x Voc x Academic | ---- | ---- | ---- | ---- | ---- | ---- |
| Houston | Sex | .0000**** | .0000**** | .0000**** | .0000**** | .0217* | .0001**** |
| | Voc Education | .0011** | .0002*** | .0059** | .0387* | ---- | ---- |
| | Academic | .0326* | .0054** | .0415* | ---- | ---- | ---- |
| | Sex x Voc Education | .0006*** | .0007*** | .0011** | ---- | ---- | ---- |
| | Sex x Academic | ---- | ---- | ---- | ---- | ---- | ---- |
| | Voc x Academic | ---- | .0197* | ---- | ---- | ---- | ---- |
| | Sex x Voc x Academic | ---- | ---- | ---- | ---- | ---- | ---- |

[a]The results with probabilities larger than .10 are not listed in this table.

* Significant at the .05 level ** Significant at the .01 level
*** Significant at the .001 level **** Significant at the .0001 level or beyond

TABLE 5.11

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES, VOCATIONAL EDUCATION AND ACADEMIC ACHIEVEMENT

| Community Area | Sex | Vocational Education | Acad. Achv. | No. of Cases | Accumulated Income Mean | Accumulated Income S.D. | Monthly Earning Mean | Monthly Earning S.D. | Hourly Rate Mean | Hourly Rate S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | Voc. Graduate | High | 5 | $ 8934 | $ 6315 | $435.4 | $175.6 | $2.48 | $1.06 |
| | | | Mid. | 17 | 8954 | 2576 | 372.2 | 69.1 | 2.05 | .35 |
| | | | Low | 26 | 8484 | 3060 | 360.6 | 120.1 | 2.13 | .54 |
| Austin-San Antonio | M | Non-Voc. Graduate | High | 7 | 8253 | 8031 | 404.0 | 235.9 | 2.88 | 1.57 |
| | | | Mid. | 15 | 7249 | 4326 | 380.9 | 101.4 | 2.13 | .57 |
| | | | Low | 14 | 6814 | 3699 | 352.1 | 103.9 | 2.28 | .98 |
| | F | Voc. Graduate | High | 21 | 7064 | 3097 | 334.3 | 59.9 | 1.93 | .38 |
| | | | Mid. | 40 | 6492 | 3046 | 313.5 | 80.6 | 1.92 | .46 |
| | | | Low | 12 | 7054 | 3619 | 322.8 | 71.3 | 1.82 | .46 |
| | F | Non-Voc. Graduate | High | 23 | 5855 | 3137 | 302.4 | 109.0 | 1.89 | .46 |
| | | | Mid. | 25 | 5246 | 3168 | 297.0 | 87.2 | 1.88 | .38 |
| | | | Low | 17 | 6142 | 2422 | 293.1 | 58.5 | 1.78 | .29 |
| | M | Voc. Graduate | High | 6 | 16586 | 15847 | 703.8 | 596.1 | 3.45 | 2.30 |
| | | | Mid. | 22 | 13202 | 6569 | 571.4 | 176.8 | 3.19 | 1.04 |
| | | | Low | 22 | 11422 | 4666 | 476.2 | 149.9 | 2.71 | .85 |
| Houston | M | Non-Voc. Graduate | High | 14 | 9035 | 4677 | 420.9 | 150.3 | 2.50 | .78 |
| | | | Mid. | 25 | 10186 | 4342 | 457.4 | 137.4 | 2.63 | .74 |
| | | | Low | 11 | 8060 | 4756 | 415.2 | 114.9 | 2.27 | .63 |
| | F | Voc. Graduate | High | 30 | 7700 | 3333 | 372.8 | 105.5 | 2.26 | .61 |
| | | | Mid. | 40 | 6241 | 3385 | 339.5 | 80.4 | 2.06 | .42 |
| | | | Low | 21 | 5861 | 3482 | 309.6 | 81.9 | 1.86 | .42 |
| | F | Non-Voc. Graduate | High | 34 | 7296 | 3468 | 339.9 | 99.7 | 2.09 | .50 |
| | | | Mid. | 22 | 6010 | 4400 | 332.5 | 119.2 | 2.09 | .61 |
| | | | Low | 18 | 7014 | 3016 | 310.4 | 79.4 | 2.21 | 1.08 |

TABLE 5.11 -- CONTINUED

SIX INDICES OF OCCUPATIONAL ACHIEVEMENT OF NON-COLLEGE HIGH SCHOOL GRADUATES IN TEXAS ACCORDING TO COMMUNITY, SEX DIFFERENCES VOCATIONAL EDUCATION, AND ACADEMIC ACHIEVEMENT

| Community Area | Sex | Vocational Education | Acad. Achv. | No. of Cases | Weekly Working Hours Mean | Weekly Working Hours S.D. | Employed Months Mean | Employed Months S.D. | Actual Job Length Mean | Actual Job Length S.D. |
|---|---|---|---|---|---|---|---|---|---|---|
| | M | Voc. Graduate | High | 5 | 41.14 Hrs | 1.34 Hrs | 19.40 Mos | 6.89 Mos | 19.80 Mos | 6.62 Mos |
| | | | Mid. | 17 | 42.50 | 4.06 | 23.76 | 3.91 | 25.37 | 5.40 |
| | | | Low | 26 | 39.55 | 7.74 | 23.37 | 4.75 | 23.39 | 6.52 |
| | M | Non-Voc. Graduate | High | 7 | 35.16 | 10.53 | 16.93 | 9.02 | 15.43 | 10.39 |
| Austin-San Antonio | | | Mid. | 15 | 42.07 | 4.90 | 17.80 | 8.42 | 18.96 | 9.20 |
| | | | Low | 14 | 37.46 | 5.22 | 19.25 | 8.90 | 18.05 | 8.54 |
| | F | Voc. Graduate | High | 21 | 40.60 | 2.60 | 20.86 | 7.61 | 21.23 | 7.98 |
| | | | Mid. | 40 | 38.45 | 6.13 | 20.29 | 7.75 | 19.62 | 7.61 |
| | | | Low | 12 | 42.28 | 6.99 | 21.17 | 8.83 | 22.82 | 11.13 |
| | F | Non-Voc. Graduate | High | 23 | 37.04 | 9.22 | 18.66 | 6.04 | 17.61 | 8.18 |
| | | | Mid. | 25 | 36.36 | 7.29 | 16.82 | 8.27 | 15.86 | 8.75 |
| | | | Low | 17 | 38.16 | 1.56 | 20.71 | 6.51 | 19.97 | 6.94 |
| | M | Voc. Graduate | High | 6 | 45.00 | 6.42 | 22.41 | 6.86 | 24.89 | 7.89 |
| | | | Mid. | 20 | 42.55 | 7.25 | 22.35 | 7.39 | 23.30 | 7.67 |
| | | | Low | 27 | 41.23 | 4.97 | 23.75 | 4.30 | 24.33 | 4.43 |
| | M | Non-Voc. Graduate | High | 14 | 39.70 | 8.83 | 21.29 | 6.50 | 21.27 | 8.83 |
| Houston | | | Mid. | 25 | 40.42 | 2.69 | 22.12 | 5.24 | 22.40 | 5.37 |
| | | | Low | 11 | 43.23 | 4.25 | 19.18 | 8.40 | 21.09 | 10.07 |
| | F | Voc. Graduate | High | 30 | 38.39 | 3.36 | 20.20 | 6.86 | 19.42 | 6.81 |
| | | | Mid. | 40 | 38.50 | 4.80 | 18.19 | 8.54 | 17.36 | 8.18 |
| | | | Low | 21 | 38.71 | 5.18 | 17.83 | 8.02 | 17.62 | 8.39 |
| | F | Non-Voc. Graduate | High | 34 | 37.66 | 5.17 | 21.49 | 9.94 | 19.61 | 7.19 |
| | | | Mid. | 22 | 37.41 | 6.95 | 17.11 | 10.06 | 16.30 | 10.11 |
| | | | Low | 18 | 36.40 | 8.14 | 21.39 | 5.92 | 19.20 | 6.58 |

by academic achievement. Secondary vocational education was significant at the .05 level in accounting for the accumulated income of the graduates from this community area. These effects of secondary vocational education were related to those of employment length since they were significant at the .01 level or beyond in accounting for weekly working hours, employed months and actual job length.

For the graduates from the Houston area, the relationship of secondary vocational education to income and employment was modified in a minor way as academic achievement was taken into account. Secondary vocational education was significant at the .01 level in accounting for accumulated income and hourly rate, and at the .001 level in accounting for monthly earning. These results, in a stronger way, were consistent with those secured from other analyses in this and previous chapters. Moreover, the effects of secondary vocational education on weekly working hours were found to be significant. Before academic achievement was included in the analysis, weekly working hours were not found to be significant in relation to secondary vocational education in any other analyses.

Male vocational graduates in the Houston area in all three achievement groups were superior to each of the three achievement groups of non-vocational graduates in accumulated income, monthly earning, and hourly rate. There was no overlapping between male vocational graduates and

their non-vocational counterparts in these three indices of occupational achievement when academic achievement was controlled. In other words, academic achievement was significant in accounting for the intra-class differences between vocational graduates and non-vocational graduates. However, secondary vocational education was more important than academic achievement in accounting for accumulated income and pay rates of male graduates in the Houston area. High academic achievement was not enough to compensate for a lack of vocational education as far as occupational achievement of the graduates was concerned.

Summary

In further testing of the effects of secondary vocational education, as marital status, ethnicity, father's occupation, father's education, and academic achievement were introduced in turn as additional test factors, the relationship between secondary vocational education and occupational achievement remained valid as stated in the preliminary analysis. Three groups of non-college vocational graduates--male and female vocational graduates in the Austin-San Antonio area, and male vocational graduates in the Houston area--were superior in accumulated income to their non-vocational counterparts in the same community area. Moreover, vocational graduates were better off than non-vocational graduates in length of employment in the Austin-San Antonio area, while the effects of secondary vocational

education were significant in pay rates in the Houston area. These results were exactly the same as reported in the preliminary findings. In spite of the fact that test factors included in further testing significantly accounted for some indices of occupational achievement under certain conditions, these associations of test factors with occupational achievement did not affect the operation of the effects of secondary vocational education. As marital status, which had significant associations with both vocational education and accumulated income, was not an extraneous variable, the control of other test factors also did not cancel the effects of secondary vocational education. Therefore, the finding that the above three groups of vocational graduates were better off in accumulated income and some other indices than their non-vocational counterparts was not a spurious relationship but a genuine fact.

NOTES

[1]Ben J. Wattenberg and Richard M. Scammon, "Black Progress and Liberal Rhetoric," Commentary 55 (April 1973): 36.

[2]Ibid., p. 37.

[3]Texas Department of Community Affairs, Texas Office of Economic Opportunity, Report of the Office, Poverty in Texas, (Austin, Tx.: Texas Office of Economic Opportunity, 1972), Table III-5, p. III-9, obtained from Department of Commerce, Bureau of the Census, Current Population Reports, Series P-60, No. 77.

[4]Lawrence Thomas, The Occupational Structure and Education, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1956), pp. 22-6.

[5]Leonard Broom and Betty J. Maynard, "Prestige and Socioeconomic Ranking of Occupations," Social Science Quarterly 50 (September 1969), pp. 369-73.

[6]Albert J. Reiss, Jr. et al., Occupations and Social Status (New York: The Free Press, 1961), p. 60.

[7]Robert W. Hodge, Paul M. Siegel and Peter H. Rossi, "Occupational Prestige in the United States, 1925-63," American Journal of Sociology 70 (November 1964): 286-302.

[8]Kenneth Little, Review and Synthesis of Research on the Placement and Follow-up of Vocational Education Students (Columbus, Ohio: The Center for Vocational and Technical Education, 1970), p. 11.

# CHAPTER VI

# CONCLUSIONS AND POLICY IMPLICATIONS

## Selection of Sample

This study was a follow-up investigation of the occupational achievement of vocational and non-vocational graduates who completed high school at the end of May, 1970. The information secured for this study was covered by a period of 27 months, dating from June 1, 1970, until August 31, 1972. A questionnaire developed by the investigator was used to obtain the information of occupational achievement. A sample of 3,045 graduates was selected for the questionnaire survey from 17 public high schools in three Texas cities--Austin, San Antonio, and Houston. These graduates were selected in such a way that each vocational graduate in a particular rank was matched by the same sex and equivalent rank. This procedure was designed for the purpose of facilitating the control of test factors for the analysis of differences in occupational achievement due to secondary vocational education.

Among the 3,045 high school graduates who were selected for receiving the questionnaire, 1,058 of them (35 percent) responded to this study by the cut-off date of October 15, 1972. By eliminating 60 respondents who had had

no employment experience by that time, and 104 respondents who had not completed the questionnaire, the findings of this study were based on the information secured from the returned questionnaires of 894 respondents (29 percent).

For the purpose of comparing the occupational achievement of vocational and non-vocational high school graduates, six indices were developed as the criteria for this study. They were accumulated income, monthly earning, hourly rate, weekly working hours, employed months, and actual job length.

## Conclusions

The results of various analyses produced several important findings in this study. First, of 894 respondents included in the analysis, 244 completed two years or more of college during a 27-month period after graduation from high school, while 157 attended college for some time ranging from 4 to 18 months during the same period of time. For these 401 working college students, secondary vocational education was not an important variable to their initial employment after high school when community, sex, and college attendance were controlled for the preliminary analysis. With a single exception of the hourly rate of female respondents from the Houston area who completed two years of college or longer, all six indices of occupational achievement were not significantly accounted for by secondary vocational education.

Second, secondary vocational education was far more important to the occupational achievement of 493 non-college high school graduates than that of working college students, as also shown in preliminary analysis. The effects of secondary vocational education were significant at the .05 level or beyond in accounting for the accumulated income and the actual job length of non-college workers of both sexes, the employed months of male non-college workers, as well as the weekly working hours of female non-college workers, in the Austin-San Antonio area. These effects also were significant (at the .05 level or beyond) to the accumulated income, monthly earning, and the hourly rate of male non-college workers in the Houston area. But, in all six indices of occupational education, no significant differences were found between vocational and non-vocational graduates for female non-college workers in the Houston area. These preliminary findings of effects of secondary vocational education were upheld by further analyses, in which marital status, ethnicity, father's occupation, father's education, and academic achievement were controlled in turn.

Third, community differences were found in the occupational achievement of high school graduates. The community variable accounted for differences in income, rather than in length of employment, of these graduates. Moreover, the community variable was related to the magnitude of differences due to the sex variable, and the nature of differ-

ences due to secondary vocational education.

More explicitly, although differences in occupational achievement due to the sex variable were real to both community areas, these differences were much stronger in magnitude in the Houston area than in the San Antonio area. Income disadvantages to female graduates in the Houston area were so apparent that female graduates in that area failed to share benefits of income advantages due to community differences. Their accumulated income and pay rates were only slightly higher than female graduates in the Austin-San Antonio area. These results, secured from the questionnaire survey in this study, were cross-validated by the 1970 census data[1] and the 1972 wage survey,[2] which led the investigator to speculate that the effects of secondary vocational education would not be significant unless strong discrimination in the labor market in a community disappear.

On the other hand, community differences seemed to be related to the operation of secondary vocational education in different ways. In the Austin-San Antonio area, effects of secondary vocational education appeared in accumulated income and lengths of employment while, in the Houston area, they were shown in accumulated income and pay rates. A reasonable speculation is the labor market in the Austin-San Antonio area rewarded more qualified and compe-

tent young workers by keeping them from being unemployed rather than giving higher pay for the same amount of time worked. On the other hand, the labor market in the Houston area rewarded the better young workers by paying them more for the same amount of time or by placing them in jobs of higher pay.

Summarily, the findings cited did not totally support, nor did they totally reject, the hypothesis of this study. Based on these findings, the effects of secondary vocational education made some differences in occupational achievement of high school graduates in a more restricted scope than that of the original hypothesis of this study as follows:

1. Secondary vocational education was by no means an important variable to the occupational achievement of working college students; with only an isolated exception, the hypothesis was rejected in all six indices of occupational achievement as far as these college students were concerned.

2. Moreover, secondary vocational education also was irrelevant to the occupational achievement of female non-college workers in the Houston area; the hypothesis was totally rejected in all six indices of occupational achievement for these female graduates.

3. Moreover, secondary vocational education did not make real differences in both monthly earning and hourly rate of non-college workers of both sexes in the Austin-San Antonio area, as well as working hours per week, employed months, and actual job length of male non-college workers in the Houston area; in these aspects, the hypothesis was rejected.

4. However, vocational graduates did have a higher mean accumulated income than non-vocational graduates as far as non-college workers of both sexes from the Austin-San Antonio area and male non-college workers from the Houston area were concerned; in the accumulated income criterion, the hypothesis was accepted for these non-college workers.

5. Finally, among non-college workers, vocational graduates fared better than non-vocational graduates in actual job length for both males and females in the Austin-San Antonio area, and in both monthly earning and hourly rate for males only in the Houston area; in this scope, the hypothesis was accepted.

## Policy Implications

The findings in this study did not merely serve to satisfy the academic curiosity of the investigator. They were more meaningful in providing facts about the occupational achievement of vocational and non-vocational graduates for vocational educators, policy makers, and the concerned public, who are in the process of soliciting public support with requests for adequate funding of vocational education programs in high schools. Whether huge amounts of public monies should be allotted for continuing support of vocational education at the secondary level is not a trivial matter.

High school vocational education has been under attack. There are two major points for which vocational education is faulted. A high proportion of vocational graduates did not stay in the jobs closely related to the training they had received in high school because the specific skills and training offered by traditional secondary vocational programs were not in great demand. And, vocational high school graduates did not have higher pay or longer employment than those non-vocational graduates enrolled in a general academic curriculum.[3] Exactly for these

allegations, a special task force of the U.S. Department of Health, Education and Welfare suggested that education for employment preparation should be postponed until "later stages" (after high school). A huge investment in vocational education under the age of 21 was not desired.[4]

Dealing with the relatedness of employment to vocational education, this study did not produce findings contrary to facts cited by the critics of secondary vocational education. Among 320 respondents who received vocational education and were working at the time of the questionnaire survey, only 42.5 percent of them remained in jobs related to, or considerably related to, their vocational training.[4] However, Somers finds in his vocational follow-up study that the relatedness of jobs to training had no significant effect on occupational status and the income of vocational graduates.[5] Therefore, the graduates working in the field of employment unrelated to their vocational education did not necessarily suffer a loss of income.

Dealing with income and employment lengths of high school graduates, the findings in this study indicated that during the period of 27 months after graduation from high school vocational graduates had greater accumulated income than non-vocational graduates due to either higher pay rates or longer periods of employment. Although a study of Kaufman and others did not produce conclusive evidence that vocational graduates fared better in hourly rates and pay

raises than non-vocational graduates,[6] the study of Kaufman and Lewis showed longer actual job length and higher monthly earning received by vocational graduates.[7] Since actual job length and monthly earning were highly related to accumulated income of high school graduates, the income information in the study of Kaufman and Lewis did support the findings in this study. Moreover, in a review study of nation-wide follow-up investigations of high school graduates, Stromsdorfer found that the beneficial return rates of vocational education came well above the "upper bound of 10 percent for the social opportunity cost rate of capital."[8]

Although undoubtedly vocational education did not quite successfully provide exact skills and training for direct use in jobs in which high school graduates worked, beneficial returns of secondary vocational education were definitely real and substantive in the long-run calculation. Further study will be required to investigate the reasons why vocational graduates fared better than non-vocational graduates, even if the former more likely than not entered a field of employment unrelated to their training. A higher occupational achievement on the part of vocational graduates at the secondary level, as illustrated in this study, should warn against a risky, immediate withdrawal of public support and lack of adequate funding of vocational programs in high schools.

## NOTES

[1]For non-college high school graduates 18-24 years old in 1969, male mean annual income in Houston, San Antonio and Austin was $4,357, $3,055, and $2,775, respectively; female mean annual income in these three metropolitan areas was $2,733, $2,492, and $2,479, in that order; see Table 4.8, Chapter IV.

[2]For order clerks, for a forty-hour work week, men earned $148 in Houston in April, 1972, and $109 in San Antonio in May, 1972; women, for 39.5 hours, made $107.5 per week in Houston in April, 1972, and $91 per week in San Antonio in May, 1972; see Note 1, Chapter IV.

[3]Editorial, Austin American, April 17, 1973; and A Special Task Force to the Secretary of Health, Education, and Welfare, Report of the Task Force, Work in America (Cambridge, Mass.: The MIT Press, 1973), pp. 138-40.

[4]The numbers of cases for four categories in Questionnaire Item 20 are 75, 61, 59 and 125, in order from "exactly the job for which I am vocationally trained" to "a job which has nothing to do with my vocational training."

[5]Gerald Somers, The Effectiveness of Vocational and Technical Programs: A National Follow-up (Madison, Wisc.: Center for Studies in Vocational and Technical Education, University of Wisconsin, 1971), pp. 205-06.

[6]Jacob J. Kaufman et al., The Role of the Secondary Schools in the Preparation of Youth for Employment (University Park, Penn.: Institute for Research on Human Resources, Penn. State University, 1967), Chapter 6, pp. 23-5, and Chapter 9, pp. 42-44.

[7]Jacob J. Kaufman and Morgan V. Lewis, The Potential of Vocational Education (University Park, Penn.: Institute for Research on Human Resources, Penn. State University, 1968), pp. 119-21.

[8]Ernst W. Stromsdorfer, Review and Synthesis of Cost-Effectiveness Studies of Vocational and Technical Education (Columbus, Ohio: The Center for Vocational and Technical Education, Ohio State University, 1972), pp. 53-6.

# APPENDICES

APPENDIX A.1

TOTAL EXPENDITURES FOR VOCATIONAL-TECHNICAL EDUCATION FROM FEDERAL AND MATCHING FUNDS FOR THE UNITED STATES AND THE STATE OF TEXAS DURING THE FISCAL YEARS OF 1967, 1968, AND 1969

| U.S. or Texas | Fiscal Year | Sources of Funds | Total | Voc. Ed. Act of 1963 or 1968 Amend. | Smith-Hughes Act | George-Barden Act, Title I | George-Barden Act, Title II | George-Barden Act Title III |
|---|---|---|---|---|---|---|---|---|
| | 1967 | All Sources Combined | $1,004,133,43 | $ 781,223,064 | $17,457,837 | $176,040,794 | $ 9,572,043 | $19,839,475 |
| | | Federal | 260,320,618 | 225,864,779 | 3,891,116 | 21,008,308 | 2,718,674 | 6,837,741 |
| | | State and Local | 743,812,3[illegible] | [illegible],358,285 | 13,566,721 | 155,032,486 | 6,853,369 | 13,001,734 |
| U.S. | 1968 | All Sources Combined | 1,192,862,965 | 967,297,096 | 20,367,427 | 172,662,461 | 10,944,660 | 21,591,321 |
| | | Federal | 262,383,716 | 230,420,003 | 3,793,040 | 19,166,346 | 2,419,590 | 6,584,737 |
| | | State and Local | 930,479,249 | 736,877,093 | 16,574,387 | 153,496,115 | 8,525,070 | 15,006,584 |
| | 1969 | All Sources Combined | 1,368,756,523 | 1,151,519,769 | 18,746,554 | 169,312,276 | 10,633,424 | 18,544,500 |
| | | Federal | 254,676,376 | 227,527,428 | 3,134,104 | 16,775,427 | 1,954,903 | 5,284,514 |
| | | State and Local | 1,114,080,147 | 923,992,341 | 15,612,450 | 152,536,849 | 8,678,521 | 13,259,986 |
| | 1967 | All Sources Combined | 57,208,769 | 34,794,803 | 1,227,968 | 19,217,428 | 477,659 | 1,490,911 |
| | | Federal | 15,824,721 | 13,120,541 | 359,602 | 1,399,426 | 236,120 | 708,359 |
| | | State and Local | 41,384,721 | 21,674,262 | 868,366 | 17,818,002 | 241,539 | 782,552 |
| Texas | 1968 | All Sources Combined | 57,151,637 | 38,545,974 | 731,867 | 15,982,004 | 472,267 | 1,419,485 |
| | | Federal | 15,738,533 | 13,022,564 | 359,602 | 1,411,888 | 236,120 | 708,359 |
| | | State and Local | 41,413,104 | 25,523,410 | 372,265 | 14,570,156 | 236,147 | 711,126 |
| | 1969 | All Sources Combined | 63,479,802 | 62,985,151 | 0 | 494,651 | 0 | 0 |
| | | Federal | 15,296,068 | 15,070,518 | 0 | 225,550 | 0 | 0 |
| | | State and Local | 48,183,734 | 47,914,633 | 0 | 269,101 | 0 | 0 |

Sources: U.S. Department of Health, Education, and Welfare, Office of Education, Vocational and Technical Education; Annual Report, Fiscal Year 1967 (Washington, D.C.: U.S. Government Printing Office, 1969), Table 22, p. 121, Table 24, p. 123, Tables 32-35, pp. 131-34; Vocational and Technical Education; Annual Report, Fiscal Year 1968 (Washington, D.C.: U.S. Government Printing Office, 1970), Table 23, p. 144, Table 25, p. 146, Tables 33-36, pp. 154-57; Vocational and Technical Education; Annual Report, Fiscal Year 1969 (Washington, D.C.: U.S. Government Printing Office, 1971), Table 22, p. 54, Table 24, p. 56, Tables 31-34, pp. 63-66.

APPENDIX A.2

CORRELATION COEFFICIENTS AMONG SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR 894 HIGH SCHOOL GRADUATES IN TEXAS

| Variable | 1 Accumulated Income | 2 Monthly Earnings | 3 Hourly Rate | 4 Weekly Working Hours | 5 Employed Months | 6 Actual Job Length |
|---|---|---|---|---|---|---|
| 1 Accumulated Income | 1.0000 | .7098 | .6066 | .2799 | .7332 | .8138 |
| 2 Monthly Earning | .7098 | 1.0000 | .7946 | .5159 | .1505 | .3409 |
| 3 Hourly Rate | .6066 | .7946 | 1.0000 | -.0246 | .1635 | .1495 |
| 4 Weekly Working Hours | .2799 | .5159 | -.0246 | 1.0000 | -.0058 | .3673 |
| 5 Employed Months | .7332 | .1505 | .1635 | -.0058 | 1.0000 | .8970 |
| 6 Actual Job Length | .8138 | .3409 | .1495 | .3673 | .8970 | 1.0000 |

APPENDIX A.3

LOADINGS ON PRINCIPAL COMPONENT FACTORS OF SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR 894 HIGH SCHOOL GRADUATES IN TEXAS

| Variable | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | $P_6$ |
|---|---|---|---|---|---|---|
| 1 Accumulated Income | .9709 | -.0487 | -.1141 | -.1932 | .0404 | .0541 |
| 2 Monthly Earning | .7712 | .6184 | .0678 | -.0341 | -.1177 | -.0561 |
| 3 Hourly Rate | .6188 | .5910 | -.4936 | .1341 | .0767 | .0190 |
| 4 Weekly Working Hours | .4132 | .2359 | .8751 | .0703 | .0238 | .0486 |
| 5 Employed Months | .7240 | -.6476 | -.1827 | .1077 | -.0958 | .0478 |
| 6 Actual Job Length | .8392 | -.5052 | .1604 | .0285 | .0757 | -.0902 |
| Variance | 3.3197 | 1.4643 | 1.0860 | .0738 | .0369 | .0192 |
| Percent | 55.3291 | 24.4053 | 18.1002 | 1.2305 | .6143 | .3205 |

APPENDIX A.4

ORTHOGONAL VARIMAX ROTATED FACTOR LOADINGS[a] OF SIX INDICES OF OCCUPATIONAL ACHIEVEMENT FOR 894 HIGH SCHOOL GRADUATES IN TEXAS

| Variable | $F_1$[b] | $F_2$[b] | $F_3$[b] | $F_4$ | $F_5$ | $F_6$ |
|---|---|---|---|---|---|---|
| 1 Accumulated Income | .7435 | .5762 | .1632 | -.2956 | -.0316 | -.0112 |
| 2 Monthly Earning | .1407 | .8665 | .4286 | -.1012 | -.1881 | -.0044 |
| 3 Hourly Rate | .0962 | .9833 | -.1173 | .0227 | .0930 | -.0205 |
| 4 Weekly Working Hours | .0827 | .0867 | .9925 | -.0206 | -.0092 | -.0093 |
| 5 Employed Months | .9859 | .0614 | -.0912 | .0675 | -.0265 | .1033 |
| 6 Actual Job Length | .9455 | .0930 | .2812 | -.0327 | -.0158 | -.1305 |
| Variance | 2.4547 | 2.0697 | 1.2965 | .1047 | .0461 | .0283 |
| Percent | 40.9109 | 34.4957 | 21.6088 | 1.7443 | .7678 | .4724 |

[a]All six rotated factors are listed in this table; however, only the first three factors are meaningful for interpretation.

[b]Number of months of employment, pay rate per hour, and number of hours per week are used to identify the first three factors. $F_1$, $F_2$, and $F_3$, respectively, in that order; these three factors combined account for 5.82 (97.02 percent) out of the total variance for six indices of occupational achievement.

APPENDIX B.1

QUESTIONNAIRE

QUESTIONNAIRE

1. Please do not remove the label at the upper right corner on this page. It is very important for processing returned questionnaires.
2. Please complete as many items as you can and give as accurate information as possible.
3. Thank you for your help and cooperation.

NAME _____ / _____ _____
First Middle Maiden Last

SEX: ___(1) Male (check one) MARITAL STATUS: ___(1) Single (check one)
___(2) Female ___(2) Married

BIRTH DATE: (check one)
___(1) After December, 1952;
___(2) Between July and December, 1952;
___(3) Between January and June, 1952;
___(4) Between July and December, 1951;
___(5) Between January and June, 1951;
___(6) Before January, 1951

1. Which do you think is the best way to describe yourself? (check one)
___(1) Black American
___(2) Mexican American
___(3) White American
___(4) Other (specify: _____ _____)

2. Which do you think is the best category to describe your father's (or male guardian's) occupation? (In case of being retired or deceased, what did he do before?) (check one)

___(1) Clothes presser in laundry, garbage collector, shoe shiner, and similar positions

___(2) Taxi driver, filling station attendant, restaurant cook, restaurant waiter, dockworker, coal miner, night watchman, janitor, and similar positions

___(3) Carpenter, plumber, pipe fitter, army corporal, owner-manager of a small store in city, owner-operator of lunch stand, mail carrier, auto repairman, playground instructor, barber, machine operator in factory, local labor union official, truck driver, salesman, store clerk, office clerk, milk route man, and similar positions

___(4) Accountant, public school teacher, owner of factory, owner-operator of a printing shop, building contractor, professional artist, city welfare worker, county official, skilled electrician, skilled machinist, undertaker, policeman, insurance agent, broker, bookkeeper, farm owner and operator, tenant farmer (who manages the farm), and similar positions

___(5) Physician, dentist, natural scientist, social scientist, college professor, lawyer, judge, mayor of a large city, departmental head in state government, civil engineer, banker, and similar positions

3. How far did your father (or male guardian) go in school? (check one)
___(1) None or some elementary school
___(2) Finished elementary school (the 8th grade)
___(3) Some high school (beyond the 8th grade)
___(4) Graduated from high school
___(5) Some college education
___(6) Graduated from a four-year college
___(7) Has bachelor of law degree, master's degree, or doctoral degree

4. Which of the following subjects in BUSINESS EDUCATION did you study in high school for at least one full year? (check as many as apply)
___(1) General business
___(2) Bookkeeping
___(3) Business machines
___(4) Clerical practice
___(5) Office training
___(6) Shorthand
___(7) Stenographic practice
___(8) Typewriting

5. Which of the following subjects in INDUSTRIAL ARTS did you study in high school for at least one full year? (check as many as apply)
___(1) General shop or general industrial arts
___(2) Drafting (not vocational drafting)
___(3) General electricity or basic electronics (not electrical trades or vocational electronics)
___(4) General machine shop or general power mechanics
___(5) Handicrafts
___(6) Metalwork (not vocational metalwork)
___(7) Radio (not vocational radio and T.V.)
___(8) General welding (not vocational welding)
___(9) Woodworking or general woodshop (not vocational woodwork)

6. Which of the following programs in VOCATIONAL EDUCATION did you take in high school? (check one; or check two if you enrolled in two vocational education programs)
___(0) None
___(1) Vocational agriculture
___(2) Distributive education (DE)
___(3) Vocational office education (VOE)
___(4) Industrial cooperative training (ICT)
___(5) Data processing
___(6) Vocational cosmetology, or dressmaking, or cooking and baking
___(7) Auto mechanics, or other auto trades
___(8) Commercial art, photography, vocational drafting, etc.
___(9) Cabinetmaking, vocational woodworking, etc.
___(10) Building trades, bricklaying, etc.
___(11) Metal or electrical trades, vocational printing, radio and T.V., electronics, air conditioning and refrigerator, etc.

7. If you took one of the vocational education programs mentioned in ITEM 6, why did you take it? (check as many as apply)
___(1) Because of parents' suggestions
___(2) Because of friends' suggestions
___(3) Because of counselor's suggestions
___(4) Because of teachers' suggestions
___(5) Because I thought it would prepare me for a job
___(6) Other (specify: _____)

8. Were you ever asked whether or not you had taken HIGH SCHOOL VOCATIONAL TRAINING when you applied for a job? (check one)
___(1) Never ___(3) Three or four times
___(2) Once or twice ___(4) Five or more times

9. How much VOCATIONAL TRAINING have you had AFTER you graduated from high school? (check one and specify)
___(1) None
___(2) Less than 6 months in _____ what school or college?
___(3) Between 6 and 12 months in _____ what school or college?
___(4) Between 1 and 2 years in _____ what school or college?
___(5) 2 full years in _____ what school or college?

10. Were you asked whether or not you had taken VOCATIONAL TRAINING AFTER HIGH SCHOOL when you applied for a job? (Check one)
___(1) Never ___(3) Three or four times
___(2) Once or twice ___(4) Five or more times

11. Please list ALL JOBS and DIFFERENT INCOMES you have ever had AFTER graduation from high school. (Different wages in the same job should be reported separately in the following spaces)

| Job title | Weekly pay or monthly pay | Hours per week | Months in job |
|---|---|---|---|
| (1) _____ | $_____ per wk<br>$_____ per mo | _____ hrs | ___ mos |
| (2) _____ | $_____ per wk<br>$_____ per mo | _____ hrs | ___ mos |
| (3) _____ | $_____ per wk<br>$_____ per mo | _____ hrs | ___ mos |
| (4) _____ | $_____ per wk<br>$_____ per mo | _____ hrs | ___ mos |
| (5) _____ | $_____ per wk<br>$_____ per mo | _____ hrs | ___ mos |

12. Have you had full-time college education (non-vocational training) since you graduated from high school? (check one and specify)
___(1) No ___(2) Yes (specify how long: _____ yrs _____ mos)

13. Have you ever had ON-THE-JOB TRAINING sponsored by your employer? (check one and specify)
___(1) None
___(2) Yes. It took about _____ months and _____ days in _____ what kind of training?

14. What kind of additional education do you intend to have in the near future? (check one)
___(1) No more education and training
___(2) Part-time vocational training for one or two years
___(3) Full-time vocational training for one or two years
___(4) Four-year college education
___(5) Other (specify: _____)

PLEASE FILL IN THE FOLLOWING ITEMS IF YOU ARE WORKING RIGHT NOW. IF YOU ARE NOT WORKING, PLEASE STOP HERE AND MAIL BACK THIS QUESTIONNAIRE.

15. How did you get your PRESENT job? (check as many as apply)
___(1) Through direct application
___(2) Through newspaper advertisement
___(3) Through private employment agency
___(4) Helped by public employment agency (specify: _____)
what agency?
___(5) Helped by high school counselor
___(6) Helped by high school teacher
___(7) Helped by family
___(8) Helped by relatives or friends
___(9) Helped by school or college where I had vocational training after high school

16. Did your present employer hire you after a test or examination? (check one and specify)
___(1) No ___(2) Yes (specify: _____)
what kind of examination?

17. Which do you think is the best category to describe your present occupation? (Check one)
___(1) Clothes presser in laundry, garbage collector, shoe shiner, and similar positions

___(2) Taxi driver, restaurant cook, restaurant waiter or waitress, filling station attendant, dockworker, night watchman, janitor, and similar positions

___(3) Carpenter, plumber, pipe fitter, auto repairman, barber, beautician, mail carrier, owner-operator of lunch stand, owner-manager of a small store in city, salesman, clerk in store, office clerk, coal miner, machine operator in factory, truck driver, milk route man, playground instructor, and similar positions

___(4) Owner of factory, owner-operator of a printing shop, farm owner and operator, tenant farmer (who manages the farm), building contractor, professional artist, skilled machinist, skilled electrician, policeman, insurance agent, broker, and similar positions

18. Where are you working right now? _____ / _____
what city? what state?

19. Write "A" in front of the high school subject or program listed below which is the most important to you in your present job activities, and write "B" in front of the second most important subject or program. (write "A" and "B")
___(1) English
___(2) Mathematics
___(3) Natural sciences
___(4) Social studies
___(5) Business education
___(6) Industrial arts
___(7) Vocational education
___(8) Speech or debate
___(9) Physical education
___(10) Foreign language (specify: _____)
___(11) Other (specify: _____)

20. If you ever took VOCATIONAL TRAINING either in high school or after graduation, specify the relatedness of your present job to your vocational training. (If you did not receive any vocational training do not fill in this item.) (check one)
___(1) I am in exactly the job for which I was vocationally trained
___(2) I am in a job which is considerably related to my vocational training
___(3) I am in a job which is somewhat related to my vocational training
___(4) I am in a job which has nothing to do with my vocational training

21. Did you have a pay raise in the LAST 12 MONTHS? (check one)
___(1) No. I have never had a raise for the last 12 months
___(2) Yes. I got a raise between 6 and 12 months ago
___(3) Yes. I got a raise between 3 and 6 months ago
___(4) Yes. I got a raise between 1 and 3 months ago
___(5) Yes. I got a raise less than one month ago

22. Do you expect a pay raise in the NEXT 12 MONTHS? (check one)
___(1) No. I do not expect to get a raise in the next 12 months
___(2) Yes. I expect to get a raise in 6 to 12 months
___(3) Yes. I expect to get a raise in 3 to 6 months
___(4) Yes. I expect to get a raise in 1 to 3 months
___(5) Yes. I expect to get a raise in less than one month.

23. How do you get along with your BOSS? (check one)
___(1) I am on the best terms with my boss
___(2) I am on good terms with my boss
___(3) I am on bad terms with my boss
___(4) I am on the worst terms with my boss

24. How do you feel about cooperation between you and your CO-WORKERS in your job? (check one)
___(1) Cooperation is excellent
___(2) Cooperation is good
___(3) Cooperation is bad
___(4) Cooperation is extremely bad

PLEASE TURN THE PAGE

25. How do you feel about the PHYSICAL SURROUNDINGS of your work? (check one)
___(1) My work is in extremely comfortable physical surroundings
___(2) My work is in mostly comfortable physical surroundings
___(3) My work is in mostly uncomfortable physical surroundings
___(4) My work is in extremely uncomfortable physical surroundings

26. How do you like the amount of your WORKING HOURS? (check one)
___(1) My working hours are too short
___(2) My working hours are just right
___(3) My working hours are too long

27. How do you like the amount of your INCOME? (check one)
___(1) My income is less than what I deserve to have
___(2) My income is just what I deserve to have
___(3) My income is more than what I deserve to have

28. What does your FAMILY think of your job? (check one)
___(1) My family is completely satisfied with my job
___(2) My family is mostly satisfied with my job
___(3) My family is mostly dissatisfied with my job
___(4) My family is completely dissatisfied with my job

29. What does your boss think about your JOB ABILITY? (check one)
___(1) My boss thinks I am excellent
___(2) My boss thinks I am somewhat above average
___(3) My boss thinks I am average
___(4) My boss thinks I am somewhat below average
___(5) My boss thinks I am very poor

30. What do your FRIENDS and ACQUAINTANCES think about your job? (check one)
___(1) They are extremely impressed with my job
___(2) They are mostly impressed with my job
___(3) They are mostly unimpressed with my job
___(4) They are extremely unimpressed with my job

31. Does your boss give you any help in order to do your job better? (check one)
___(1) My boss is always helpful
___(2) My boss is usually helpful
___(3) My boss is sometimes helpful
___(4) My boss is never helpful

32. It takes me about ____ hours and ____ minutes to go to work from where I live. My transportation usually is _____ . (fill in blanks)

33. I usually work on ___(1) day shift; ___(2) night shift;
___(3) other (specify: _____) (check one)

34. Considering EVERYTHING about your present job, how do you feel about it? (check one)
___(1) I am completely happy with my job
___(2) I am mostly happy with my job
___(3) I am mostly unhappy with my job
___(4) I am completely unhappy with my job

# APPENDIX B.2

## LETTER USED IN FIRST MAILING

THE UNIVERSITY OF TEXAS AT AUSTIN
DEPARTMENT OF CULTURAL FOUNDATIONS OF EDUCATION
COLLEGE OF EDUCATION
AUSTIN, TEXAS 78712

August 14, 1972

Dear Graduate:

We are undertaking a research project sponsored by the Texas Education Agency. We have secured approval of your school district and high school in obtaining your name and address, along with those of your fellow graduates in 1970.

Our research is a follow-up study of the occupational achievement of high school graduates in Texas. You have been selected in this project to provide information about your job experience. By giving your cooperation to this study, you will be doing a great service toward the improvement of high school education in Texas.

We sincerely hope that you will fill out the research questionnaire which is enclosed with this letter. It will take only about ten minutes to complete.

An envelope is also enclosed with this letter for your convenience in returning the questionnaire. There is no need to put any stamps on this envelope. Please return the completed questionnaire to us as soon as possible.

Thank you very much for your cooperation.

Sincerely yours,

John Laska
Associate Professor

J.W. Chiou
Research Associate

JL:JWC/amc
Enclosures

# APPENDIX B.3

## LETTER USED IN SECOND MAILING

THE UNIVERSITY OF TEXAS AT AUSTIN
DEPARTMENT OF CULTURAL FOUNDATIONS OF EDUCATION
COLLEGE OF EDUCATION
AUSTIN, TEXAS 78712

September 5, 1972

Dear Graduate:

We are working on a research project of the occupational achievement of high school graduates in Texas. We are sincerely seeking your cooperation to fill out the questionnaire which is enclosed with this letter.

We sent the same questionnaire to you on August 14, 1972. Up to this moment, we still have not heard from you. We would like to ask you to spare about ten minutes of your time to help us, because your cooperation is most important to our research in providing valuable information for the improvement of education in Texas.

An envelope is also enclosed with this letter for your convenience in returning the questionnaire. There is no need to put any stamps on this envelope. Please return the completed questionnaire to us as soon as possible.

Thank you very much for your cooperation.

Sincerely yours,

John Lasha
Associate Professor

J.W. Chiou
Research Associate

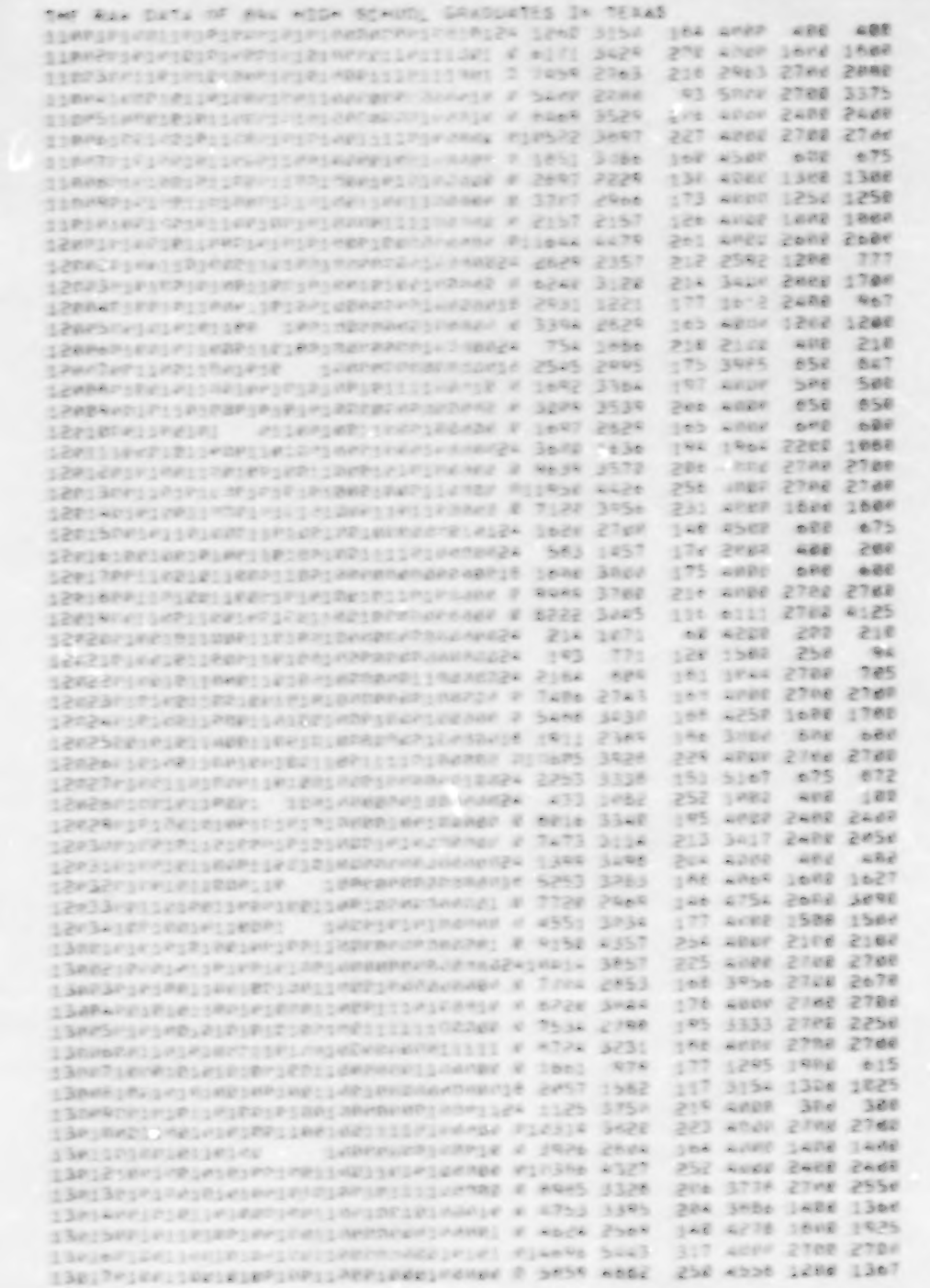
J.L.JWC/mm
Enclosures

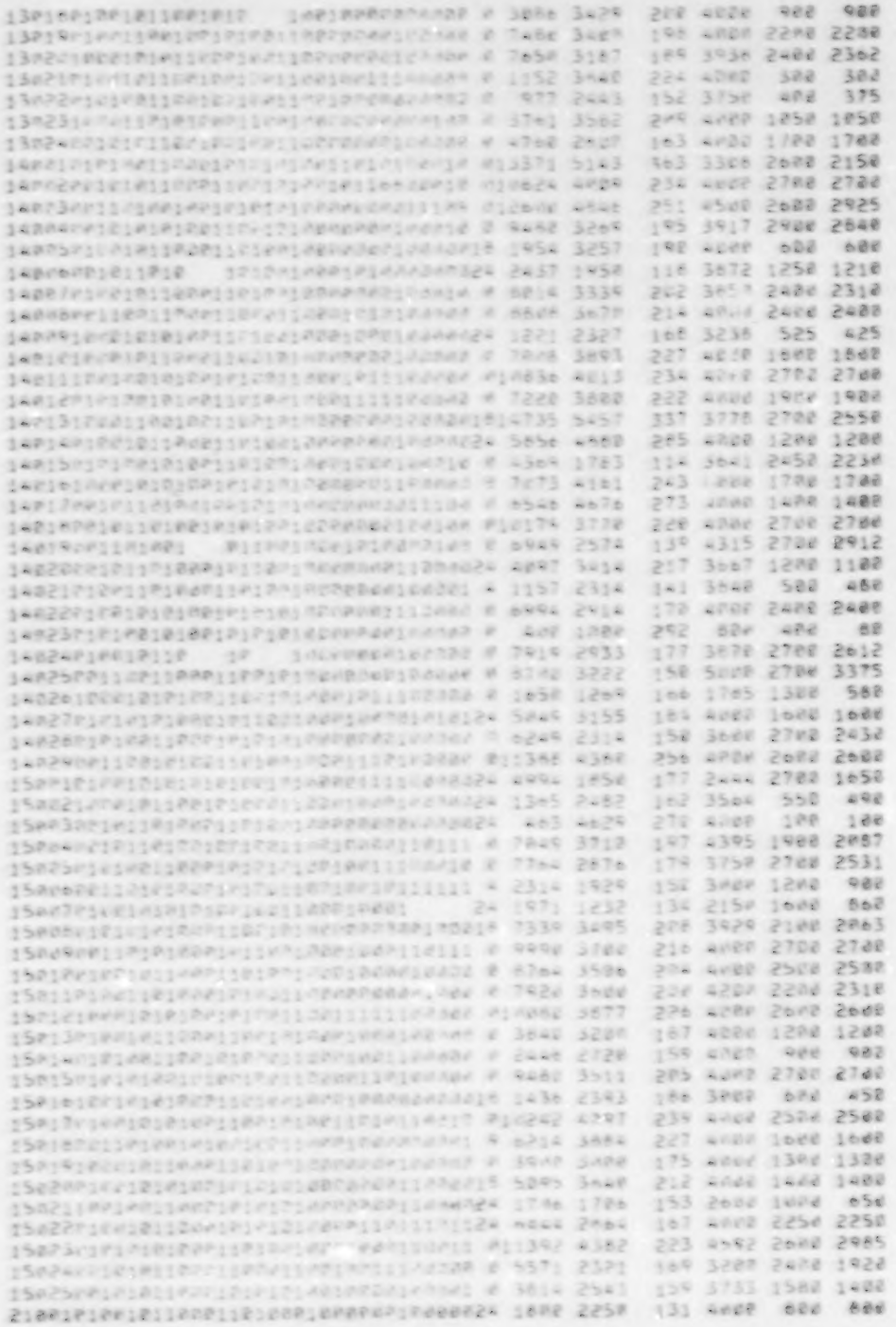
# APPENDIX C

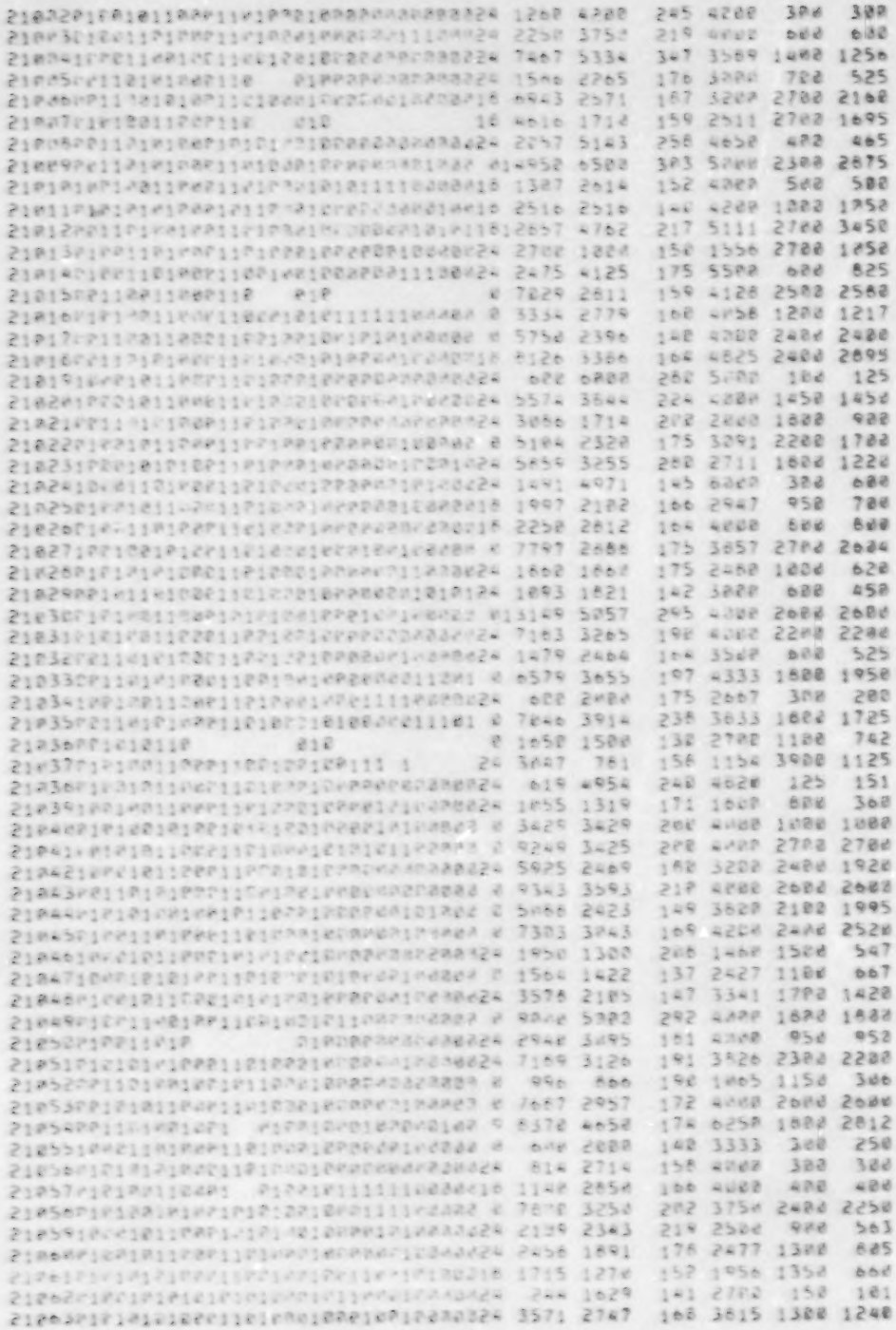
## CODED RAW DATA OF 894 HIGH SCHOOL GRADUATES IN TEXAS

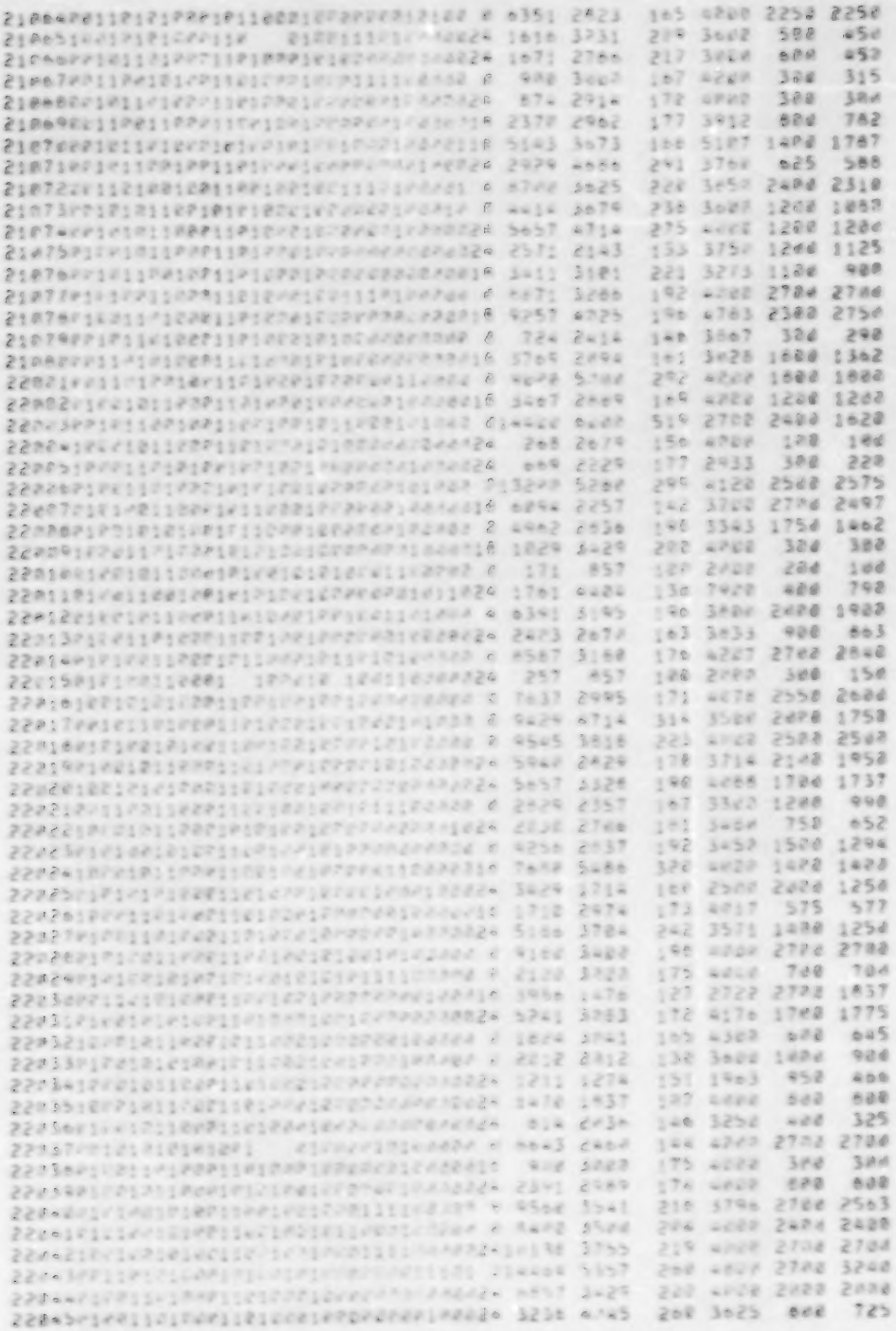
| Columns | Contents Specialized |
|---|---|
| 1-5 | ID CODE |
| 6-8 | ACADEMIC ACHIEVEMENT (HIGH=100, MID.=010, LOW=001) |
| 9-10 | VOCATIONAL EDUCATION (VOC. GRAD.=10, NON-VOC. GRAD.=01) |
| 11-12 | SEX (MALE=10, FEMALE=01) |
| 13-14 | MARITAL STATUS (SINGLE=10, MARRIED=01) |
| 15-17 | ETHNICITY (BLACK=100, MEX. AM.=010, WHITE=01) |
| 18-19 | OCCUPATION OF FATHER (HIGH=10, LOW=01) |
| 20-22 | EDUCATION OF FATHER (COLLEGE=100, HIGH SCHOOL=010, ELEMENT. SCHOOL=001) |
| 23-25 | COMMUNITY (AUSTIN=100, SAN ANTONIO=010, HOUSTON=001) |
| 26-31 | BUSINESS EDUCATION (GEN. BUSINESS=100000, BOOK-KEEPING=010000, SHORTHAND=001000, TYPING=000100, BUSINESS MACHINE=000010, CLERICAL PRACTICE=000001) |
| 32-36 | INDUSTRIAL ARTS (GEN. IND. ARTS=10000, DRAFTING=01000, HANDICRAFTS=00100, WOODWORKING=00010, OTHERS=00001) |
| 37-38 | COLLEGE ATTENDANCE (IN TERMS OF MONTHS) |
| 39-43 | ACCUMULATED INCOME ($, F5.0) |
| 44-48 | MONTHLY EARNING ($, F5.1) |
| 49-53 | HOURLY RATE ($, F5.2) |
| 54-58 | WEEKLY WORKING HOURS (HRS, F5.2) |
| 59-63 | EMPLOYED MONTHS (MOS, F5.2) |
| 64-68 | ACTUAL JOB LENGTH (MOS, F5.2) |

TWO AGE DATA OF HIGH SCHOOL GRADUATES IN TEXAS









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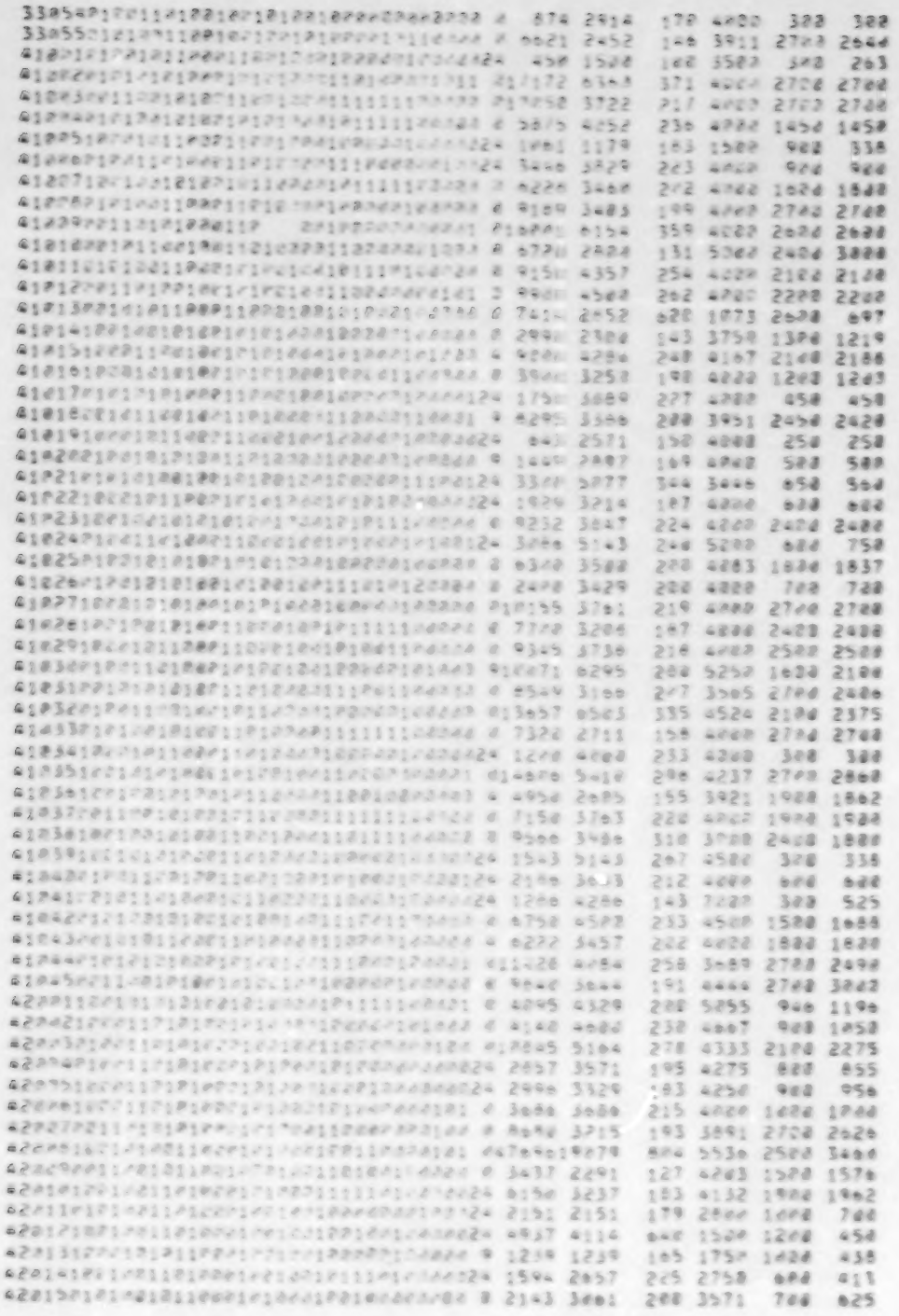

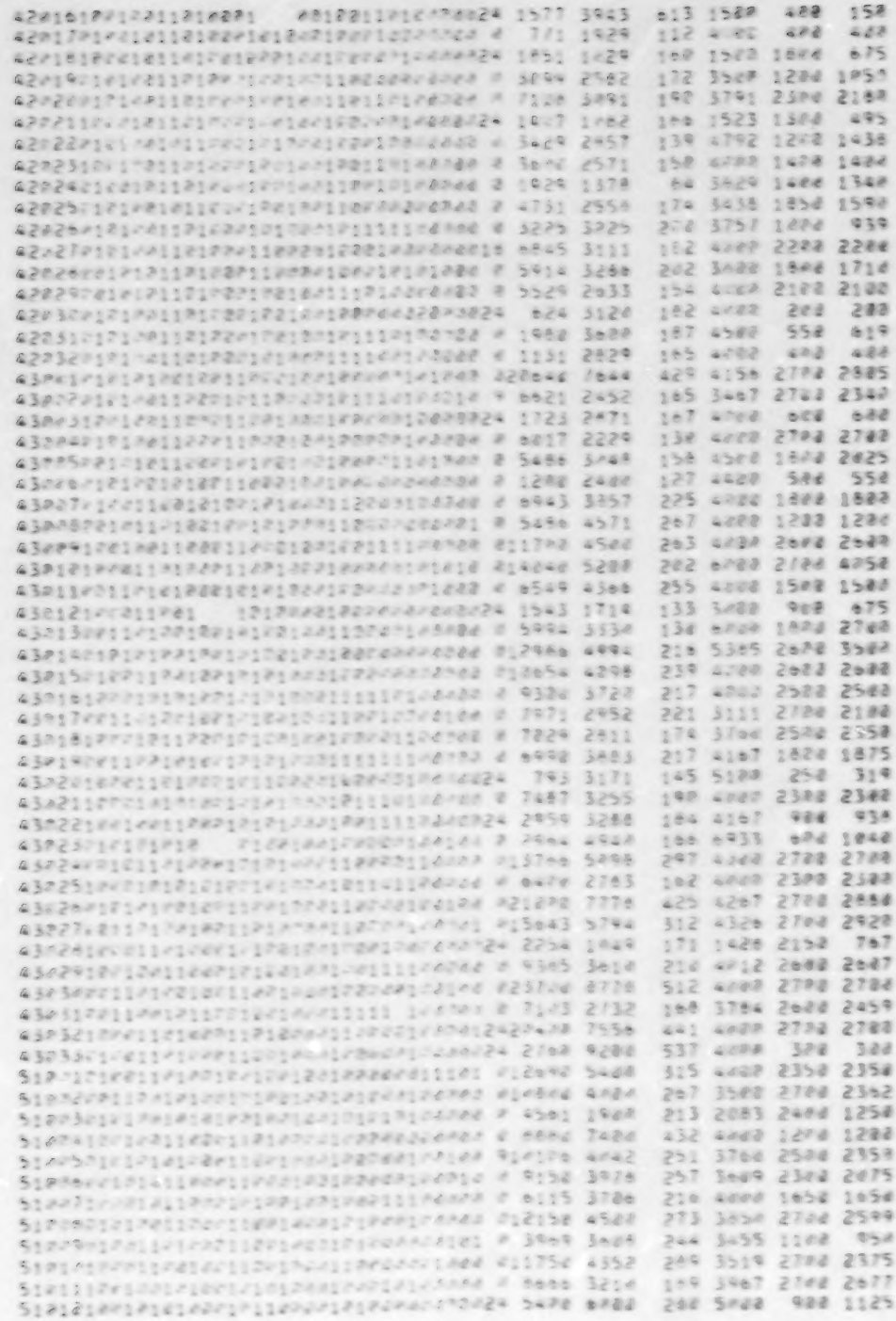

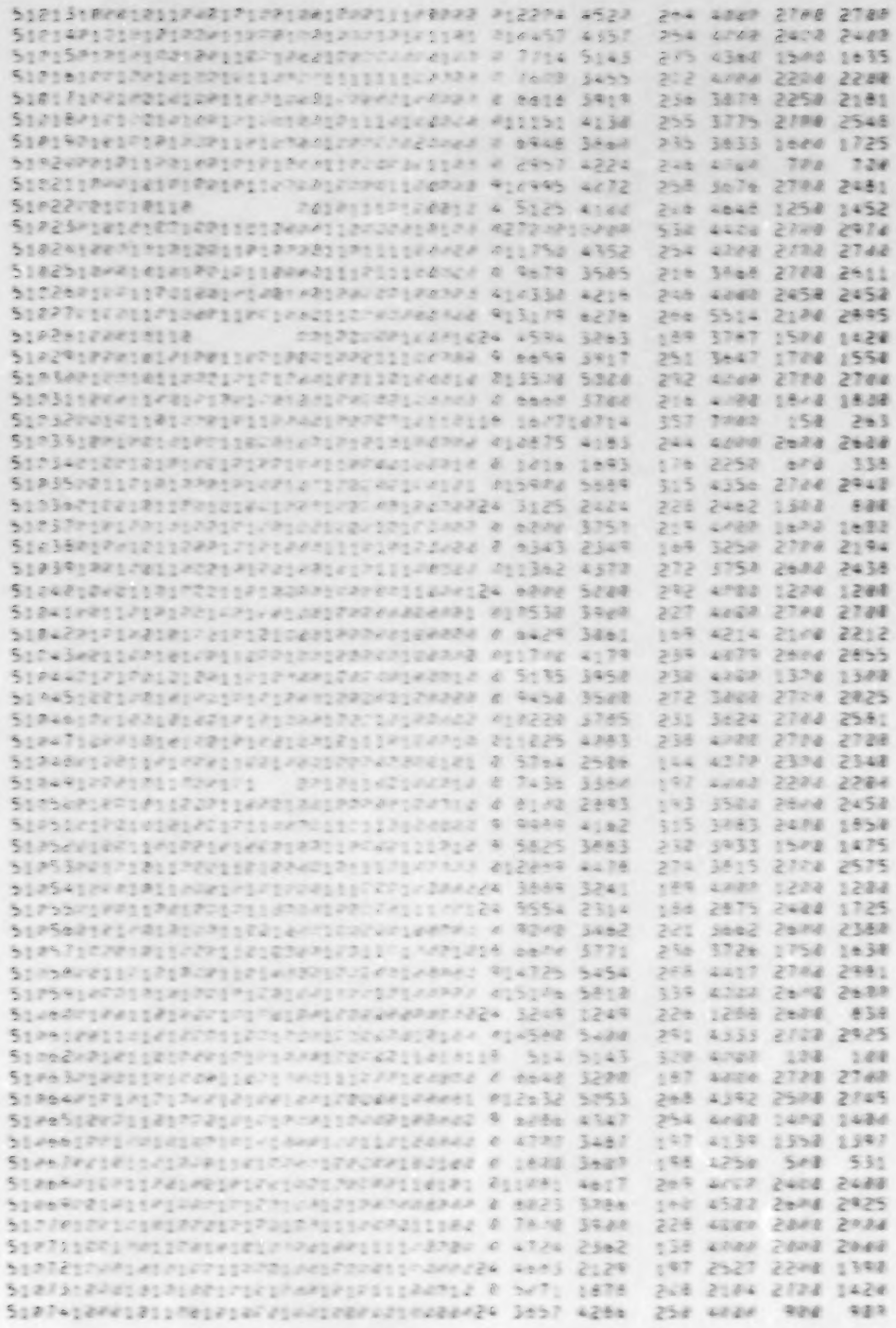

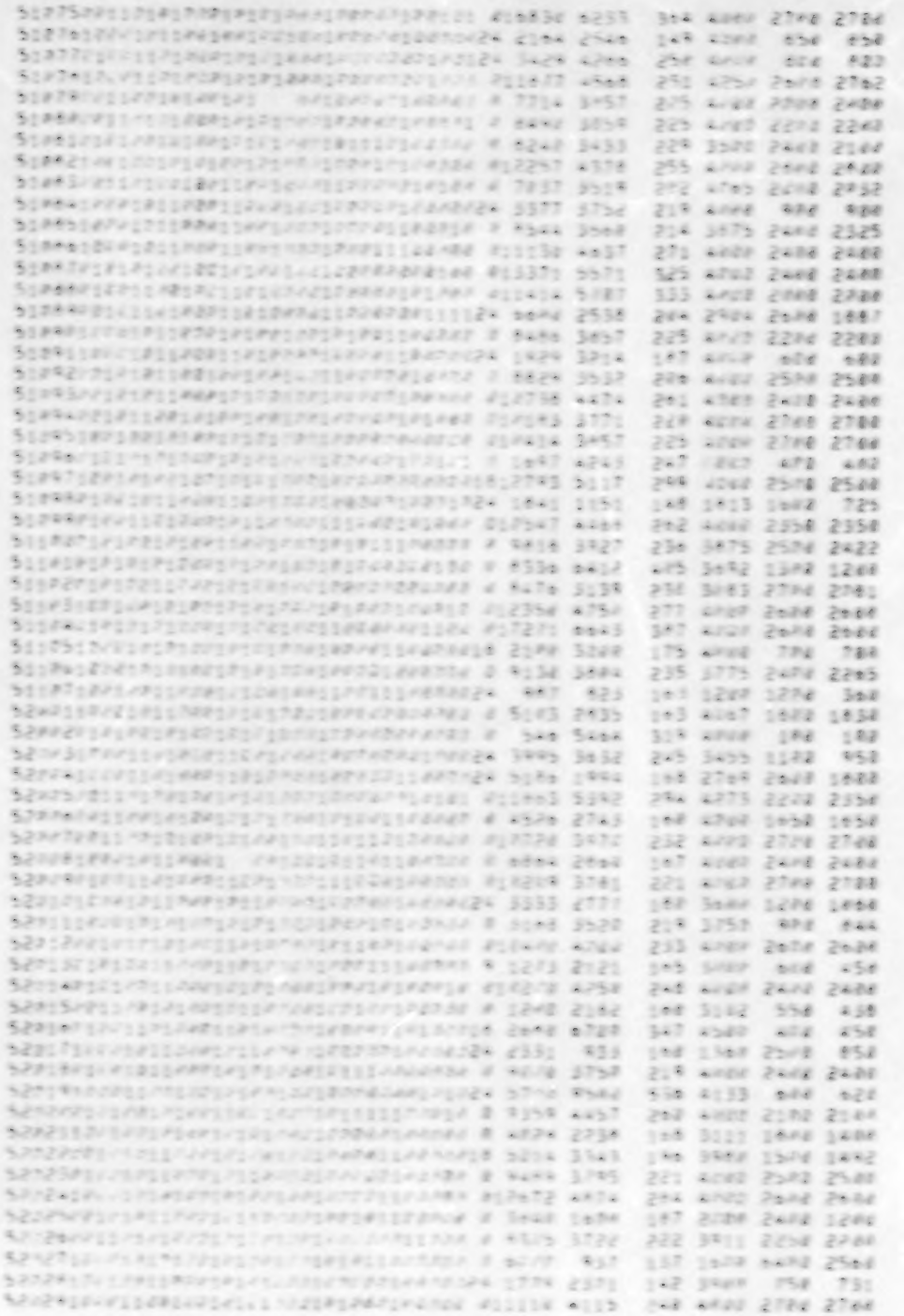

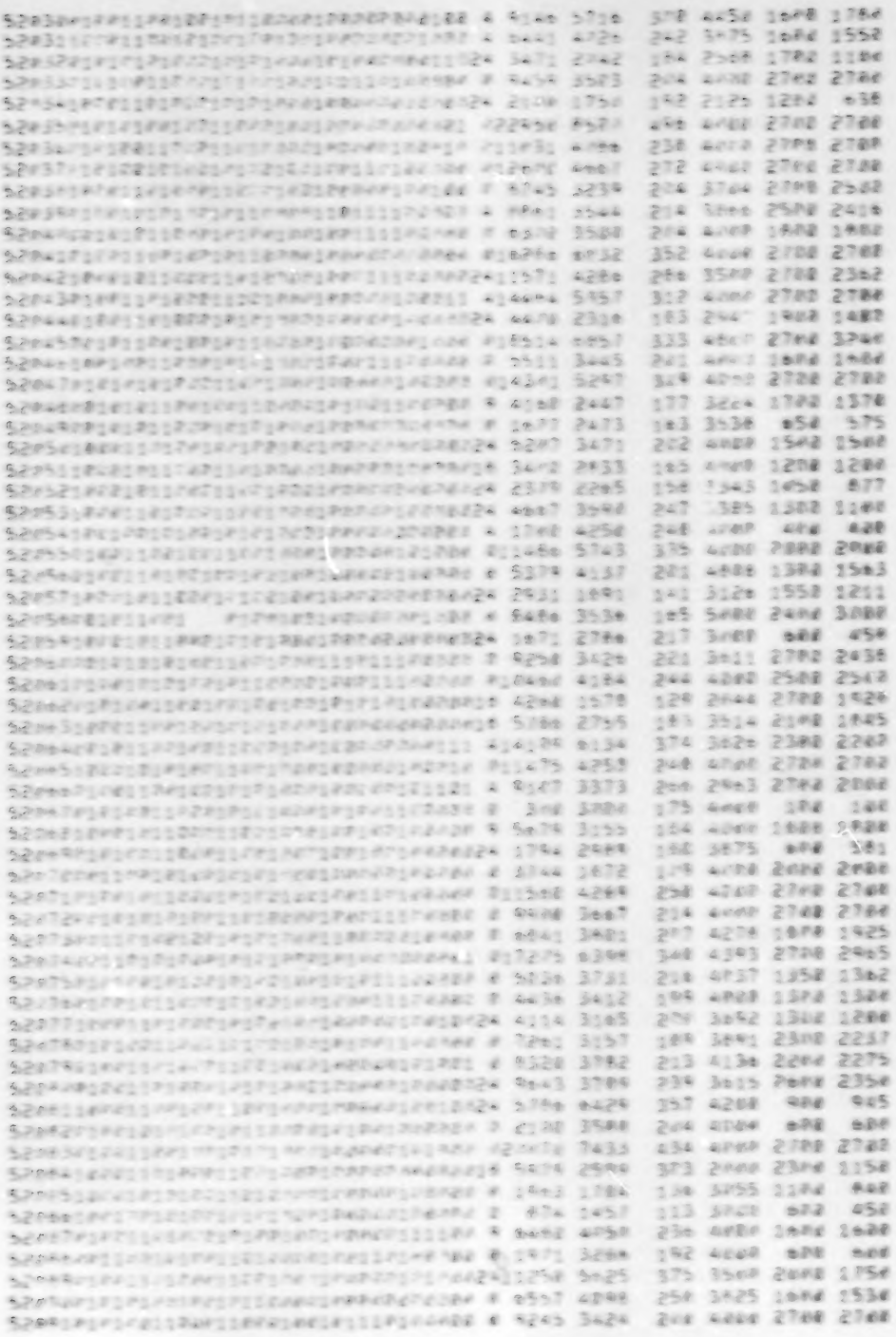

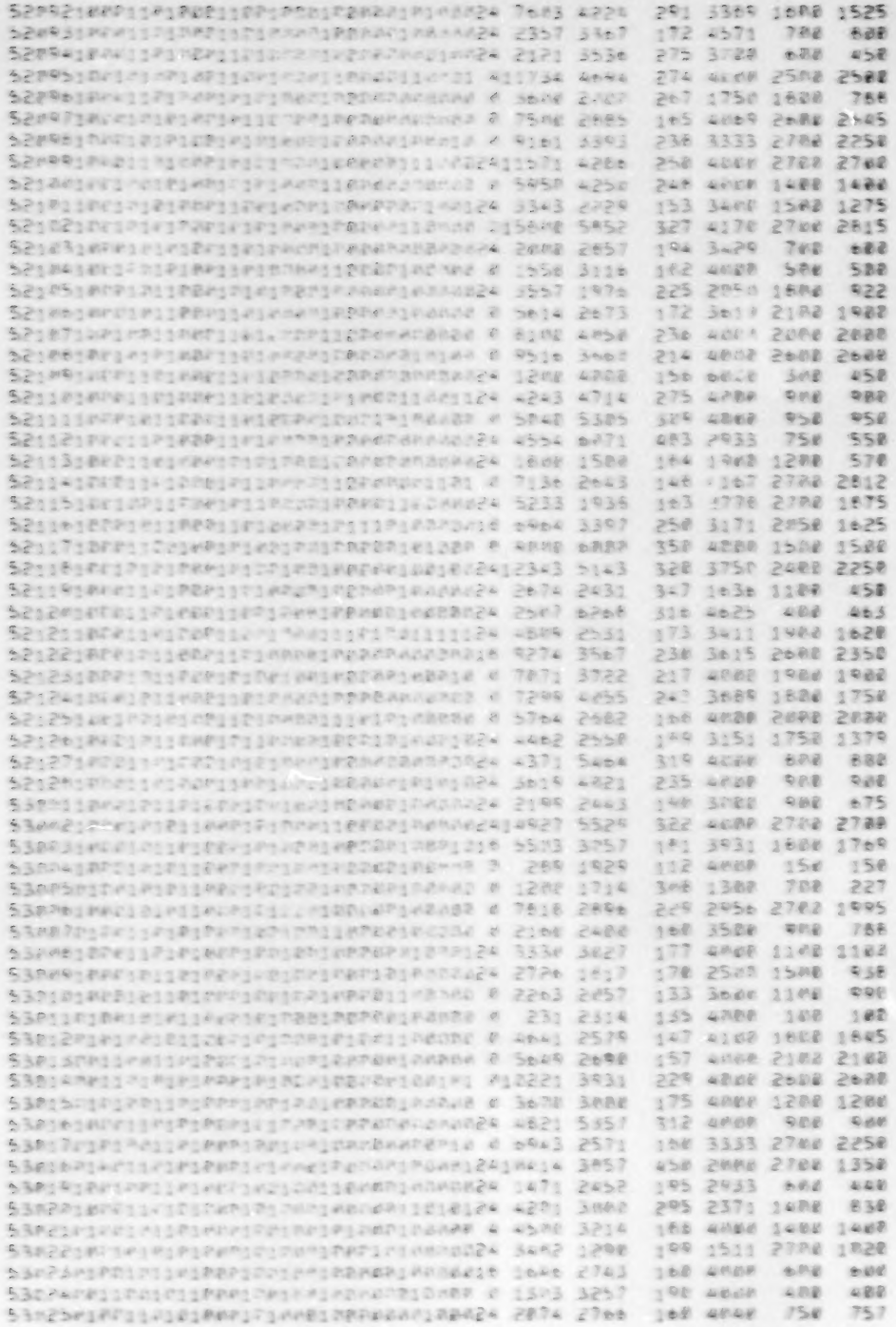

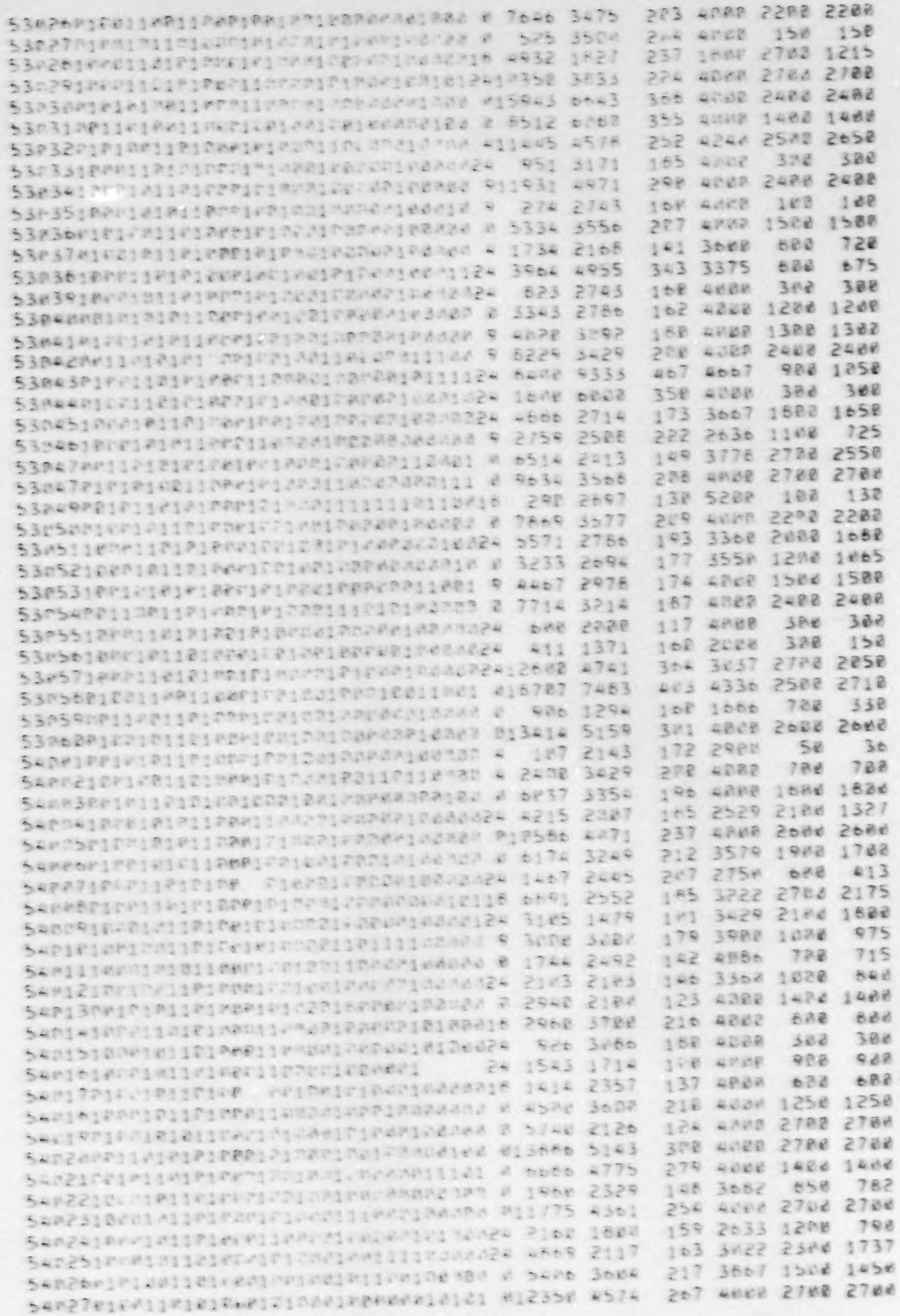

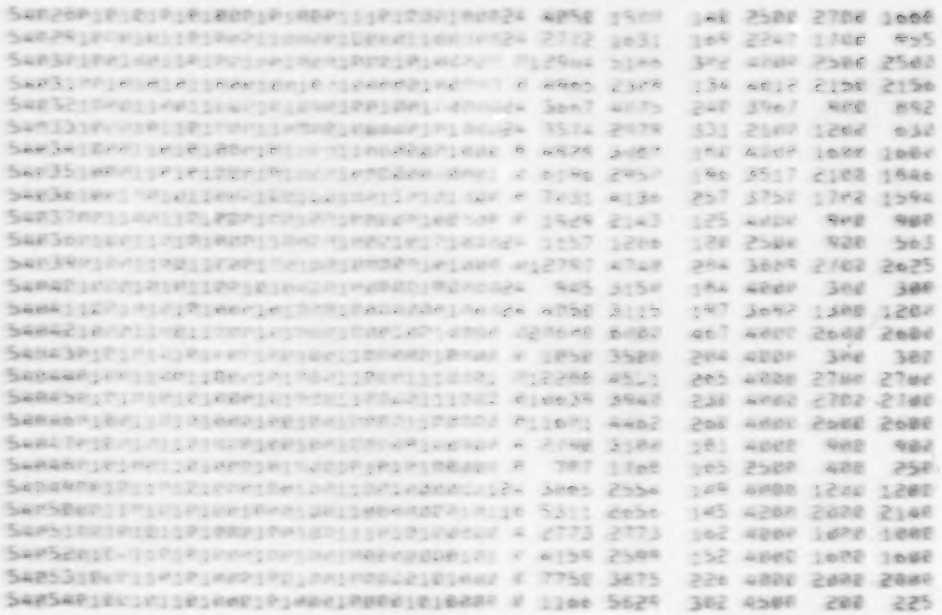

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